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1982 BAY AREA AIR QUALITY PLAN

San Francisco bay area

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*Draft for
public review*

PREPARED BY:
ASSOCIATION OF BAY AREA GOVERNMENTS
BAY AREA AIR QUALITY MANAGEMENT DISTRICT
METROPOLITAN TRANSPORTATION COMMISSION
WITH THE ASSISTANCE OF:
CALIFORNIA AIR RESOURCES BOARD
CALIFORNIA DEPARTMENT OF TRANSPORTATION



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DRAFT 1982 BAY AREA AIR QUALITY PLAN

prepared by

Association of Bay Area Governments
Bay Area Air Quality Management District
Metropolitan Transportation Commission

Hotel Claremont, Berkeley, California 94705

July, 1982

LET'S • CLEAR • THE

air

San Francisco Bay Area 1982 Air Quality Plan Update

If the air we breathe in the San Francisco Bay Area is going to be clean enough to meet federal standards by the 1987 Clean Air Act deadline, we're going to have to work on new ways to clean it up.

There are three agencies in the Bay Area responsible for helping you plan ways to improve air quality: the Association of Bay Area Governments, the Bay Area Air Quality Management District and the Metropolitan Transportation Commission. Together they have come up with a list of proposals for the San Francisco Bay Area Air Quality Plan Update that they believe will allow us to meet the deadline.

Ozone-forming hydrocarbons and carbon monoxide are the two pollutants we're trying hardest to reduce in the local atmosphere. Studies by the three agencies show that we're going to have to decrease the amount of hydrocarbons being dumped into the air regionwide by 80 to 90 tons a day. Carbon monoxide problems are localized in San Jose, Oakland and Vallejo.

The air quality experts, planners and your elected officials have been studying, debating and considering a long list of possible air quality control measures--things to do to reduce the hydrocarbons and carbon monoxide in the air. They've narrowed them down to a list of ideas they think are the most cost-efficient and practical.

Now they'd like your help in deciding which items on the list should be included in the plan.

Heading the slate of proposals is one that actually isn't controlled by any one of the three agencies--vehicle inspection and maintenance, also known as I&M.

Over the years a number of I&M bills have been introduced at the state level, only to be set aside. Senator Robert Presley's SB 33 for I&M is now wending its way through the committee review process. If this legislation is passed, up to 41 tons of hydrocarbons and 480 tons of carbon monoxide will be prevented from entering the air in the region each day.

Stationary source control measures, together with transportation control measures, administrative measures and others are suggested to eliminate the more than 40 additional tons of hydrocarbons that must be removed each day.

The 34 control measures proposed by BAAQMD could result in a daily decrease of about 70 tons of hydrocarbons.

BAAQMD has ranked the measures in order of cost effectiveness and expects no more than the first 22 will be needed to reach federal standards, if I&M is passed and is as effective as anticipated. An additional 12 proposals would be placed on a contingency list to be activated if they are needed later.

MTC proposes 15 transportation measures, most of which reaffirm programs that already have been successful in significantly re-

(continued on back page)

• Proposed Bay Area Air Q

MEASURE	HC* reduction (tons/day)	Cost per ton (\$1000/ton)	MEASURE
● <u>MOTOR VEHICLE INSPECTION AND MAINTENANCE</u> (I&M) (HC and CO **)	29-41 (480-CO)	2.6-3.7 (0.2-CO)	● <u>TRANSPORTATION CONTROL MEASURES FROM MTC</u>
● <u>STATIONARY SOURCE CONTROL MEASURES FROM BAAQMD</u> (ranked in order of cost effectiveness)***			1. Reaffirm commitment to 28% transit ridership increase from 1978 through 1983.
1. Tanker Ballasting (31)	2.5	1.6	2. Support post-1983 improvements identified in public transit operators' 5-year plans; after consultation with the operators adopt ridership increase targets for 1983-1987.
2. Reciprocating Engines (19)	4.0	0.2	3. Seek to expand and improve public transit beyond commitment levels.
3. Gasoline Distribution (11)	1.0	0.5	4. Continue to support development of High Occupancy Vehicle (HOV) lanes. (Emissions credit would not be allowed for specific projects until environmental studies were completed and funded were programmed.)
4. Pesticides (15)	3.7	0.4	5. Continue to support RIDES van carpooling efforts.
5. Wood Furniture Coating (6)	1.1	0.5	6. Continue efforts to obtain funding to support long-range transit improvements.
6. Electronics Industry (32)	5.7	1.8	7. Reaffirm commitment to parking programs that encourage mass transit use.
7. Organic Chemical Manufacturing (1)	0.3	0.5	8. Encourage transit operators to work with Caltrans to identify under-utilized lots along major transit lines that could be used as park-and-ride lots.
8. Aerospace Assembly and Component Coating (23)	0.5	1.0	9. Continue present Commute Alternatives Program.
9. Aerosol Cans (8)	3.0	0.55	10. Encourage cities to change parking regulations to decrease parking requirements for employers and encourage car/van pooling.
10. Coating of Plastics (33)	2.0	1.0	11. Complete the bicycle element of the MTC Regional Transportation Plan.
11. Industrial Maintenance Coatings (28)	1.0	1.0	12. Place additional emphasis on flextime programs as part of commute alternatives program
12. Volatile Organic Compound (VOC) Storage (13)	3.0	0.275 up to 1.5	
13. Large Commercial Bakeries (38)	1.1	1.0	
14. Marine Lightering (9)	0.6	1.0	
15. Zero Gap Seals on Floating Roof Tankers (42)	1.5	1.2	
16. Polymer and Resin Manufacturing (5)	0.2	1.6	
17. Rubber/Plastics Products (24)	1.1	1.6	
18. Coatings Manufacturing (17)	0.2	2.0	
19. Natural Gas and Crude Oil Production and Processing (4)	1.6	0.75	
20. Sanitary Landfill Sites (29)	7.2	3.6	
21. Vegetable Oil Manufacturing (22)	0.4	1.0	
22. Volatile Organic Waste Disposal (7)	6.0	unknown	
<u>Contingency Measures</u> (if others not sufficient)			
23. Automobile Refinishing (14)	5.2	2.8	
24. Letterpress/Offset Printing (3)	3.0	1.8	
25. Architectural Coatings (12)	1.0	1.5	
26. Ship, Barge, Tanker and Railcar Loading (10)	3.0	2.5 up to 7.0	
27. General Solvent and Surface Coating Operations (2)	1.5	6.0	
28. Pleasure Boats (emission standards for new engines) (25)	7.0	8.0	
29. New Source Review (35)	0.2	varies	
30. New Service Stations (secondary assist vapor recovery) (41)	(up to 0.002)	unknown	
31. Gradual Replacement 2-Stroke Lawnmowers (18a)	0.1	0.2	
32. Phase Out 2-Stroke Off-Road Motorcycles (27a)	0.8	0.4	
33. Wineries (ethanol emissions) (16)	0.1	2.0	
34. Marine Vessel Gas-Freeing (30)	0.1	0.5	

* HC=hydrocarbons ** CO=carbon monoxide *** Original I.D. number assigned to each measure by

Quality Control Measures •

HC reduction (tons/day)	Cost per ton (\$1000/ton)	MEASURE
2.0 (all 15 measures)	0.2 (all 15 measures)	13. Encourage cities to use CEQA-enforcement procedures to restrict the development of commercial drive-through facilities. 14. Encourage large delivery fleet operators to restrict vehicle idling either through company policy or the use of vehicle controls. 15. Disseminate information to fleet operators in the Bay Area on the economic and technical benefits of alternative engines and fuels.
		● <u>ADMINISTRATIVE PROGRAMS FOR LONG-TERM MAINTENANCE FROM ABAG, MTC, BAAQMD</u> (FOR HC and CO) 1. Advisory review of projects and plans. 2. Conformity assessment of federally-supported activities.
		● <u>ADDITIONAL MEASURES RECOMMENDED BY THE JOINT AIR QUALITY PLANNING ADVISORY COMMITTEE</u> 1. Land use controls. 2. Mandatory indirect source review. 3. Public support for transit. 4. Additional transportation measures to be identified by the California Air Resources Board.
		● <u>ADDITIONAL MEASURES TO REDUCE CO PROPOSED BY ABAG, BAAQMD, MTC</u> -<u>San Jose</u>: implement Santa Clara Valley Corridor Evaluation recommendations, including a light rail system in the Guadalupe Corridor. -<u>Oakland</u>: study of future development in central business district. -<u>Vallejo</u>: existing programs expected to be sufficient.

BAAQMD noted in parentheses

(continued from front page)

ducing automobile use in the Bay Area. The San Francisco-Oakland metropolitan area is ranked third in the nation for the proportion of commuters who travel on public transit.

The Commission estimates its recommendations should subtract two tons of hydrocarbons and 26 tons of carbon monoxide a day.

A number of proposals are effective in dealing with both hydrocarbons and carbon monoxide, such as two administrative programs for long-term air quality maintenance. The first would provide for cooperation among the three agencies as they review and comment on projects that could have significant impact on air quality in the region.

The second program would require that any federally-supported project would be reviewed to see that it conforms to the Bay Area Air Quality Plan.

Members of the Joint Air Quality Planning and Advisory Committee--public officials representing each of the three agencies--have recommended that we also consider land use controls, mandatory review of indirect sources of air pollution, more public support for transit, and additional transportation control measures.

Carbon monoxide standards may be attained in San Jose with just I&M. However, the plan supports implementing the Santa Clara Valley Corridor Evaluation recommendations, including a light rail system in the Guadalupe Corridor.

A study of future development in the central business district has been proposed for Oakland's carbon monoxide problems. Although Vallejo sometimes exceeds standards now, it is expected to meet the 1987 deadline with existing controls on motor vehicles, as newer low-emission cars replace old ones.

During ABAG, MTC and BAAQMD hearings, you will have an opportunity to comment on the choice of measures to be included in the plan.

Each of the proposed air quality control measures is listed on the inside of this information sheet. For detailed information about the transportation control measures, contact MTC. BAAQMD can be called about stationary source control proposals. For information about the administrative and other programs, contact ABAG.

Phone numbers for ABAG, BAAQMD and MTC are included at the end of the "Calendar" on this page.

• Tentative Air Quality Calendar •

<u>Event</u>	<u>Date</u>	<u>Event</u>	<u>Date</u>
Draft 1982 Bay Area Air Quality Plan ready for release.....	July 12	Public Hearing: BAAQMD Board of Directors.....	September 1
Air Quality Information Workshop.....	July 29	Plan Adoption: MTC meeting.....	September 22
ABAG Regional Planning Committee review and recommendation.....	August 4	Plan Adoption: ABAG Executive Board.....	September 23
Public Hearing: MTC Work Program Committee.....	August 13	Plan Adoption: BAAQMD Board of Directors.....	October 6
Public Hearing: ABAG Work Program and Coordination Committee.....	August 26	For further information, contact: ABAG at (415) 841-9730, BAAQMD at (415) 771-6000, or MTC at (415) 849-3223. Please call to check for changes in the calendar.	

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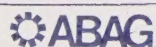


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SECTION I

SUMMARY OF THE PLAN

The purpose of this plan is to update and revise the 1979 Bay Area Air Quality Plan, which is part of the State Implementation Plan for California, and is also part of the San Francisco Bay Area Environmental Management Plan.

This plan describes the Bay Area's air quality problems and outlines the control programs needed to solve them. It addresses air quality standards set by the federal government to protect public health, and sets forth an approximate time schedule for adopting and implementing these programs if the 1987 deadlines resulting from the Clean Air Act are to be met.

REVIEW OF THE 1979 BAY AREA AIR QUALITY PLAN

The 1979 Plan contained four major program elements:

- o Use of available control technology on existing stationary sources
- o New source review
- o Motor vehicle inspection and maintenance
- o Transportation system improvements

At that time, it was projected that implementation of these programs would result in attainment of the federal ozone and carbon monoxide standards by 1985. Three major factors have led to the need for 1982 Plan revisions:

- o Authorization for the motor vehicle inspection and maintenance program adopted in the 1979 Plan has not yet been provided by the California legislature.
- o The regulations adopted by the BAAQMD to implement the use of available control technology and new source review will be less effective than assumed in the 1979 Plan;
- o Significant improvements have been made in the data base and models used to forecast future air quality.

PRESENT AND PROJECTED AIR QUALITY PROBLEMS

In the Bay Area, federal standards for ozone (O_3) and carbon monoxide (CO) are exceeded, and this plan is directed at these two pollutants. Federal standards for sulfur dioxide (SO_2) and nitrogen

dioxide (NO₂) are being met, and are not expected to be a problem in the future. The federal secondary standard for total suspended particulates (TSP) is exceeded on occasion, and was addressed in a separate plan revision submitted to the Environmental Protection Agency in 1980, and approved by EPA on March 29, 1982.

Ozone

The most complex air quality problem in the Bay Area is the ozone problem. The federal one-hour standard is 12 parts per hundred million (pphm), while the levels measured in the Bay Area (primarily in the Santa Clara Valley) reach 19 pphm. Ozone is not emitted directly into the atmosphere, but is produced in the atmosphere through a complex series of chemical reactions involving hydrocarbons (organic compounds) and oxides of nitrogen (NO_x). High ozone levels occur primarily during the summer and early fall;^x the number of days that the ozone standard is exceeded varies from year to year depending on meteorological conditions. In 1979 there were 15 exceedances recorded.

In the Bay Area the most efficient way to reduce ozone levels is to reduce hydrocarbon emissions. In 1979 there were 732 tons of hydrocarbons emitted per day in the Bay Area, not including emissions from natural vegetation. By 1987 emissions will be reduced to 515 tons per day due to the implementation of existing and previously adopted control programs as described in the 1979 Bay Area Air Quality Plan.

There is no single, major source of hydrocarbon emissions; instead, there are many sources of different types and magnitudes (e.g., cars, trucks, industries, petroleum-based solvents and other products, etc.) spread over the entire region. Moreover, the long history of air pollution control in the Bay Area means that the most effective and cost-effective control options have already been implemented. The remaining options will generally cost more and have less effect than those now being implemented. By 1987 the maximum hourly ozone level is projected to be 14.4 pphm, 2.4 pphm above the federal standard. To achieve this final increment of air quality improvement, hydrocarbon emission reductions of approximately 85 tons per day are required. (This value will vary slightly depending on the mix of sources and hydrocarbon species that are controlled.)

Carbon Monoxide

Carbon monoxide is a sub-regional air quality problem caused almost exclusively by motor vehicle exhausts. The major problem area is the Santa Clara Valley, centered on San Jose; other problem areas exist in Oakland and Vallejo. The federal one-hour CO standard of 40 mg/m³ (35 ppm) has not been exceeded in the Bay Area; the eight-hour standard of 10 mg/m³ (9 ppm) was exceeded on 21 days in 1979, with levels reaching 18 mg/m³. These exceedances occur in areas where two criteria are met: 1) high traffic density; and 2) adverse meteorological conditions produced on stagnant, winter evenings with surface-based radiation inversions. This combination of factors occurs most frequently and most intensively in the Santa Clara Valley.

Hot spot CO monitoring programs were conducted in San Jose and other locations in the Santa Clara Valley during the winters of 1978, 1979, and 1980. These studies have revealed the occurrence of high background CO levels on stagnant winter evenings. This means that the high CO levels measured are due more to areawide CO emissions than emissions from a specific highway or intersection. This phenomenon strongly suggests that street or intersection-specific traffic controls will be relatively ineffective in reducing ambient CO levels, and that control programs that are applied over wider areas will be most effective. By 1987, maximum 8-hour CO concentrations in downtown San Jose are projected to be reduced to 13.7 mg/m³ by existing control programs, 3.7 mg/m³ above the federal standard. Thus, a 27% reduction in CO emissions in the San Jose area will be necessary to meet that standard.

PROPOSED CONTROL PROGRAMS

The 1982 Bay Area Air Quality Plan recommendations are divided into two parts, addressing ozone and carbon monoxide separately. Each of these parts is further divided into primary and contingency components: the primary component contains those control measures that are recommended for implementation at this time; the contingency component contains those control measures that are recommended for later evaluation and implementation if it is demonstrated that reasonable further progress toward attainment of federal standards cannot be achieved with the primary measures. Other control measures that were considered in the process but judged to be not reasonably available are summarized in Appendix D.

The proposed control programs (not including contingency measures) and their impacts are summarized in Table 1. Brief descriptions of each measure follow.

Motor Vehicle Inspection and Maintenance

A motor vehicle inspection and maintenance (I/M) program is a vital link in the overall strategy for both ozone and carbon monoxide. Since the California legislature has thus far been unable to adopt the necessary authorizing legislation for I/M, this program is proposed once more for the 1982 Plan. The most recent version of I/M legislation is SB33 (Presley), which has been passed by the Senate and is currently awaiting action in the Assembly. An annual inspection program with a 30% failure rate is assumed for this measure.

Stationary Source Control Measures

Twenty-two new regulations are proposed by the Bay Area Air Quality Management District for implementation. An additional twelve regulations are proposed for the contingency portion of the plan. These regulations all act to reduce hydrocarbon emissions, thereby reducing ozone levels in the region.

PROPOSED FOR IMPLEMENTATION

Tanker Ballasting: The Coast Guard has adopted a rule requiring segregated ballast or a washed ballast tank and an inert gas system for tankers larger than 40,000 DWT.

Reciprocating Engines (gasoline/gas fuel): New rule requiring reduction of hydrocarbon emissions from reciprocating engines. Replace two-cycle engines with four-cycle; replace four-cycle engines with electric motors where possible.

Gasoline Distribution: Modify Regulation 8 - Rule 6 and Rule 7 by lowering exemption cut-offs to require Phase I and Phase II controls at additional service stations.

Pesticides: New rule banning the use of weed oil, requiring the use of water or other non-VOC carriers and limiting overspray.

Wood Furniture Coating: New rule requiring 50% reduction of VOC through the use of low solvent coatings and high transfer efficiency spray methods.

Electronics Industry: New rule would require control of significant solvent emitting sources by condensation, adsorption, etc.

Organic Chemical Manufacturing: New rule requiring control of volatile organic compound (VOC) fugitive emissions from pumps, compressors, process vessel depressurization and process relief valves. Limits would be similar to existing limits for petroleum refining plants.

Aerospace Assembly and Coating Operations: Regulation 8 - Rule 29 is being developed, with an independent workshop schedule.

Aerosol Spray Cans: New rule limiting the use of VOC propellants. Substitute pump, stick, roll-on containers or use N_2/CO_2 propellants. Reformulate to lower reactivity/quantity of VOC diluents and propellants.

Coating of Plastics: New rule would require control of VOC emissions by the use of low-solvent coatings or equivalent control by condensation, adsorption, incineration, etc.

Industrial Maintenance Coatings: New rule requiring the use of low solvent coatings for some industrial maintenance applications.

VOC Storage: Modify Regulation 8 - Rule 5 by lowering control requirement cut-offs from 1.5 psia and 40,000 gallons to 0.5 psia and/or 10,000 gallons.

Large Commercial Bakeries: New rule requiring control of oven VOC emissions from large commercial bakeries.

Marine Lightering: New rule requiring use of deep draft lighter vessels or minimum ullage limits to reduce lightering emissions.

Zero Gap Seals for Floating Roof Tanks: Modify Regulation 8 - Rule 5 to require installation of "zero gap" seals on most floating roof tanks.

Polymer and Resins Manufacturing: New rule requiring control of VOC emissions from reactor vessels, etc., by condensation, adsorption.

Rubber/Plastic Products Manufacturing: New rule requiring control of VOC emissions from molding, curing, cementing, etc., by condensation, adsorption or incineration.

Coatings Manufacturing: New rule requiring control of VOC emissions from reactors, blenders, mixers, and transfer and storage. Requirements would be similar to existing requirements for pharmaceutical products in Regulation 8 - Rule 24.

Natural Gas and Crude Oil Production: New rule requiring control of VOC fugitive emissions from valves, flanges, pumps, compressors, relief valves, and storage tanks. Limits would be similar to existing limits for petroleum refining plants.

Sanitary Landfill Sites: New rule requiring the installation of gas collection systems. Gas would be combusted directly or separated into a saleable methane portion and a non-methane portion, to be incinerated.

Vegetable Oil Manufacturing: New rule requiring control of VOC emissions from extractors, desolventizers, dryers, coolers and conveyors by a mineral oil scrubber and proper maintenance and operation per draft EPA CTG.

Volatile Organic Waste Disposal: New rule requiring stripping and recovery of VOC from wastes prior to disposal.

PROPOSED FOR CONTINGENCY

Automobile Refinishing: New rule requiring 50% reduction of VOC emissions by lowering VOC content of automobile refinishing coatings.

Letterpress/Offset Printing: Modify Regulation 8 - Rule 20 by deleting letterpress/offset exemption and adding specific VOC emission limits.

Architectural Coatings: Modify Regulation 8 - Rule 3 by lowering the VOC content limit for flat coatings from 250 to 125 grams per liter.

Ship, Barge, Tanker and Railcar Loading: New rule(s) requiring 90 to 95% control of VOC emissions by vapor balance, condensation, etc.

General Solvent and Surface Coating Operations: Modify Regulation 8 - Rule 4 by lowering hourly and daily VOC emission limits.

Pleasure Boats (gasoline and diesel fuel): New rule requiring hydrocarbon controls on new engines.

New Source Review: Modify Regulation 2 - Rule to increase the onsite offset ratio for VOC from 1.0:1 to 1.1:1 or 1.2:1 on an annual average basis.

New Service Stations: Modify Regulation 8 - Rule 7 to require the use of vacuum assist vapor recovery systems for vehicle fueling at new service stations.

Lawnmowers: New rule banning the sale of two-cycle lawnmowers and limiting hydrocarbon emissions from new four-cycle engines.

Off-Road Motorcycles (gasoline two-cycle): New rule banning the sale of new two-cycle engines in favor of four-cycle.

Wineries: New rule requiring control of VOC emissions during fermentation by condensation, absorption, etc.

Marine Vessel Gas-Freeing: New rule would require gas freeing be conducted outside District waters with exceptions for safety considerations, etc.

Transportation Control Measures

Fifteen transportation measures are proposed for implementation. These measures act to reduce both hydrocarbon and carbon monoxide emissions regionwide.

PROPOSED FOR IMPLEMENTATION

1. Reaffirm commitment to 28% ridership increase between 1978 through 1983.
2. Support post-1983 improvements identified in operator's 5-year plans; after consultation with the operators adopt ridership increase target for 1983-1987.

3. Seek to expand and improve public transit beyond committed levels.
4. Continue to support development of HOV lanes. (Emission reduction credit would not be allowed for specific projects until environmental studies were completed and funds were programmed.)
5. Continue to support RIDES efforts.
6. Continue efforts to obtain funding to support long-range transit improvements.
7. Reaffirm commitment to preferential parking programs.
8. Encourage transit operators to work with Caltrans to identify under-utilized lots along major transit lines which could be used as park-and-ride lots.
9. Continue present commitment to Commute Alternatives Program.
10. Encourage cities to change zoning regulations to decrease parking requirements for employers who encourage car/vanpooling.
11. Complete the bicycle element of the MTC Regional Transportation Plan.
12. Continue MTC Commute Alternatives Program and place additional emphasis on flextime program.
13. Encourage cities to use CEQA enforcement procedures to restrict the development of commercial drive-through facilities.
14. Encourage large delivery fleet operators to restrict vehicle idling either through company policy or the use of vehicle controls.
15. Disseminate information on the economic and technical benefits of alternative engines and fuels to fleet operators in the Bay Area.

PROPOSED FOR CONTINGENCY

No contingency transportation measures have been identified for ozone. Selection of such measures will take place within six months of a determination that reasonable further progress toward attainment of the ozone standard is not being made. For carbon monoxide, the recommendations of the Santa Clara Valley Corridor Evaluation, including a light rail transit system for the Guadalupe Corridor, are included as contingency. (This measure is being pursued independently, but is included as contingency because funding is not certain at this time.)

In addition to the programs mentioned above, a comprehensive transportation and air quality study of projected Oakland central business district development is proposed. This study is recommended because of the large number of sizeable projects recently proposed for that area where excesses of the CO standard are known to occur.

No additional control programs are recommended for Vallejo since it is projected to attain the CO standard by 1987 with existing control programs.

Administrative Programs for Long-Term Maintenance

Two administrative programs that would enhance the ability of the region to maintain improved air quality over the long term are recommended for the plan. Those measures are:

Advisory Review of Projects and Plans: This program is directed toward new or modified facilities, both public and private, and plans that could result in significant impacts on air quality. Such facilities would include major shopping centers, office developments, large housing developments, highways, airports, parking structures and entertainment complexes. While they are not direct air pollution sources themselves, they do attract large volumes of vehicle traffic which can lead to air quality problems. Such review systems are currently in effect on a mandatory basis at Lake Tahoe and other areas in the nation. The Advisory Review system proposed here would be, as the name implies, advisory in nature. It would be conducted administratively as part of Plan and Project Review functions and would use the existing California Environmental Quality Act environmental document process as the primary vehicle for receiving information and communicating comments. The three co-lead air quality planning agencies (ABAG, MTC, BAAQMD) would participate and issue coordinated comments on specific projects, and would work with cities, counties and project sponsors to minimize adverse air quality impacts.

Conformity Assessment of Federally-Supported Activities: This program would implement the requirements of Sections 176(c) and 316 of the Clean Air Act, which require that federally-supported activities be in conformance with the State Implementation Plan for an area.

The proposed program would be conducted as part of ABAG's Plan and Project Review function. As the areawide clearinghouse for all federal grant applications (under requirements of the Federal Intergovernmental Cooperation Act and the Federal Demonstration Cities and Metropolitan Development Act), ABAG's Executive Board comments on federal grant applications for conformity with adopted regional policies, including provisions of the air and water quality management plan. Hence, conformity assessment under the two Clean Air Act sections cited above can be easily conducted using ABAG's existing Plan and Project Review function.

Additional Programs Proposed by the Joint Air Quality Planning and Advisory Committee (JAQPAC) for Consideration in the Plan

Four additional programs were approved by the JAQPAC for consideration in the draft plan. Due to their controversial nature, they are described separately from the other measures. (More extensive descriptions appear in Appendix C.) The four programs are as follows:

Land Use Measures: Otherwise known as "compact growth", this program was proposed as part of the draft Environmental Management Plan for the Bay Area, and was rejected by most of the regional and local policy boards evaluating the draft plan. This measure was estimated to result in 24 tons/day of hydrocarbon emission reductions by the year 2000, with little impact expected by 1987. Compact growth is to some degree already occurring in the Bay Area due to limited land availability, high housing costs and other factors.

Mandatory Indirect Source Review: This mandatory review process would replace "Advisory Review of Projects and Plans" for indirect sources above specified size criteria. A new category of Authority to Construct permits would be issued to applicant-developers by the BAAQMD. As an alternative mechanism, each city and county in the District could amend its building permit regulations to include air quality requirements according to uniform standards. In the latter case, the local applications would be reviewed by BAAQMD or by the three co-lead air quality planning agencies. Comments on the permits would then be forwarded to the cities and counties for their final permit actions.

Public Support for Transit: The Bay Area, like other regions across the nation, requires large public subsidies to fund their transit operations. In fiscal year 1980-81, federal assistance of \$41 million covered 9% of the costs of this region's transit operations. The current national Administration plans to phase out transit operation assistance by 1985. Transit operators are trying to maintain service by cutting costs through productivity improvements and raising fares. The Administration is also seeking to eliminate funds for transit expansion. However, the ability of transit districts to obtain additional nonfederal revenues to replace the federal cuts is severely limited. MTC recommends that, rather than cutting out federal subsidies altogether, Congress should adopt a new formula for distributing the monies that is largely based on service factors.

Additional Transportation Measures Suggested by the California Air Resources Board: The California Air Resources Board staff have recommended that a number of measures that have been implemented in various cities should be considered for implementation as part of the 1982 Bay Area Air Quality Plan. These measures include:

- o Trip reduction ordinances requiring employers and/or business property landlords to promote transit use, ridesharing participation and use of other alternative travel modes among employees;

- o Computerized telephone information systems for transit which provide bus arrival times at the caller-specified bus stop to reduce uncertainty and wait time (and thereby promote transit ridership);
- o Bicycle facilities ordinances to encourage the use of bicycles as an alternative to the automobile;
- o Management of parking supply and parking requirements in local zoning ordinances to provide preferential parking for carpools and reduce parking availability for specified target groups such as commuters;
- o Driver training programs to promote trip management and vehicle maintenance practices;
- o A variety of voluntary programs such as flextime, employer bus fare subsidy programs and private education programs to encourage the public to drive less.

In addition, a number of programs were identified that are either already being implemented in the Bay Area or are already proposed as part of this plan. The ARB-recommended measures are described in more detail in Appendix C.

BENEFITS AND COSTS OF THE PLAN

Reducing ambient ozone and carbon monoxide will result in benefits in three major areas:

- o improvements in public health
- o reduction in damage to vegetation
- o reduction in damage to other materials

Ozone causes a wide variety of health problems including: irritation of the eyes and mucous membranes, impaired lung function and changes in the cellular composition of the lungs, increased susceptibility to infectious disease, biochemical imbalances in the lungs and other organs, rapid pulse, cough, chest discomfort, and a general decrease in human performance. Exposure to ozone also aggravates conditions such as asthma, chronic bronchitis and emphysema.

Ozone also has negative effects on a variety of plants and man-made materials. The economic losses nationwide due to vegetation damage from ozone and other photochemical oxidants was estimated in 1978 to be \$300 million per year. Ozone has been shown to cause more rapid deterioration of rubber products, fading in textiles, paints and dyes, and more rapid deterioration of fibers in many textile products.

The primary effect of carbon monoxide is to displace oxygen in the blood which, in turn, decreases the supply of oxygen to various parts of the body, particularly the cardiovascular and central nervous systems. Exposures to levels as low as 15 ppm have produced cardiovascular and nervous system effects such as decreased alertness, muscular incoordination, decreased learning ability and visual perception, changes in sleep patterns and decreased manual dexterity. In addition, large segments of the population are at increased risk from CO exposure; such high risk groups include fetuses, person with cardiovascular or nervous system conditions, sickle cell anemics, the young and the elderly.

The costs of these effects lie primarily in terms of human suffering, inconvenience, incapacitation and ecological damage. The benefits of controlling ozone and carbon monoxide lie in the reduction or elimination of such effects. The annual costs of implementing the proposed control programs are indicated in Table 1 and total approximately \$100 million. This amounts to an annual cost of about \$20 per person or \$50 per household, on the average, in the Bay Area.

IMPLEMENTATION SCHEDULE

The proposed control programs are targeted for phased implementation between 1983 and 1987, beginning with the most effective programs. Rough dates are indicated in Table 1 in each case. Figure 1 illustrates the overall year-by-year progress that is expected for hydrocarbon emission reductions with both existing and proposed control programs.

ANNUAL AIR QUALITY REPORTS

Annual air quality reports are prepared in response to Sections 171, 172, and 173 of the 1977 Clean Air Act Amendments, and in response to annual report requirements issued by the U.S. Environmental Protection Agency and the California Air Resources Board. Their purpose is to provide the public and regulatory agencies with a progress report on the effectiveness of air pollution control programs in reducing both emissions and ambient levels of air pollutants in the Bay Area.

The goal of the 1982 Bay Area Air Quality Plan is to achieve ambient air quality standards in the Bay Area by 1987 by controlling pollutant emissions. Assessing the effectiveness of control programs on an annual basis will identify successes or failures of the programs in meeting the goal of the 1982 Plan. If emissions are not decreasing at rates that will allow standard attainment by 1987, then further controls must be adopted and implemented.

Thus, the annual reports will serve as the principal vehicle for determining needs, evaluating options, and amending the plan. Future annual reports will include the following items:

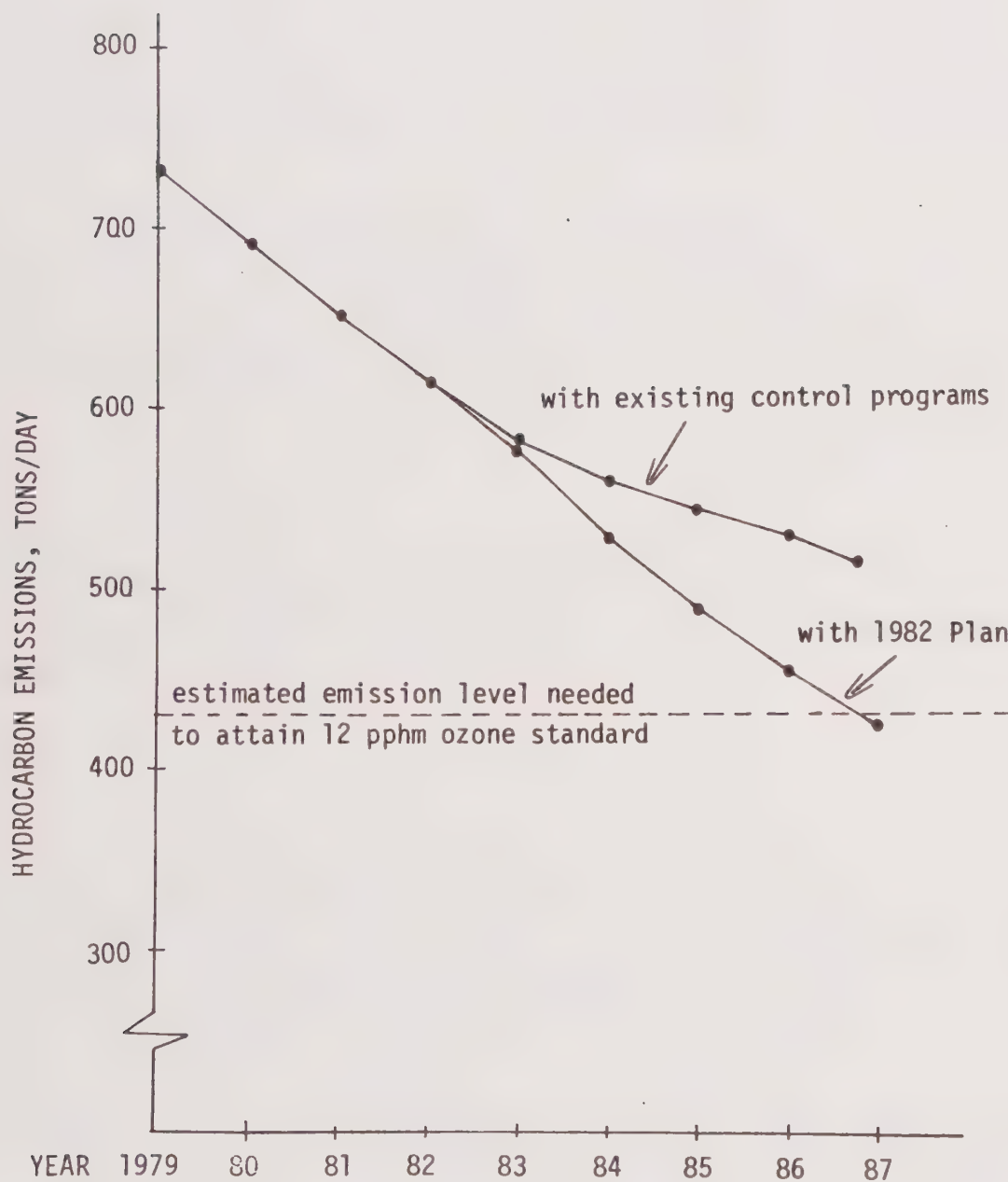


Figure 1. Schedule of Hydrocarbon Emission Reduction Proposed to Achieve the Federal Ozone Standard in the San Francisco Bay Area

- o Updated emission inventories and emission inventory projections;
- o Updated assessments of ambient air quality in the proceeding year and developing trends;
- o Updated assessments of demographic and economic trends in the Bay Area;
- o Results from a regional travel monitoring system designed to track trends in vehicular travel in the Bay Area;
- o Review of progress in implementing the control programs adopted in the 1979 and 1982 Bay Area Air Quality Plans;
- o Review of changes in the specification of reasonably available control technology (RACT) and best available control technology (BACT) for various source categories;
- o Updates on the Air Resources Board's suggested control measure (SCM) process, and the applicability of such SCMs to the Bay Area;
- o Review of new state and federal regulations pertaining to the Plan or to sources affected by the Plan, as needed;
- o Assessment of whether "reasonable further progress" toward attainment of federal air quality standards was achieved during the previous year.

Future funding for this activity is uncertain, and the depth of coverage of each of these items will vary depending on the resources that can be made available for this purpose.

TABLE 1. SUMMARY OF PROPOSED CONTROL MEASURES AND THEIR IMPACTS

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
I. MOTOR VEHICLE INSPECTION AND MAINTENANCE						
Implement annual inspection/ maintenance program to ensure that motor vehicles in the light-duty auto, light- and medium-duty truck classes have operating emissions controls and that they con- form to prescribed emissions standards.	Carbon monoxide: 480 Hydrocarbons: 41	California Department of Consumer Affairs	A-1984 I-1987	\$77,000,000	-State General Fund -I/M Program Revenues	New legisla- tion re- quired.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> - o See "Direct Benefits" column. <u>Water Quality</u> - o No impact. <u>Physical Resources</u> - o Reducing emissions of air pollutants will have a beneficial impact on vegetation and other man-made materials which are currently being damaged by such pollutants. These beneficial effects will result from this strategy as well as the others being proposed in this plan. <u>Energy Resources</u> - o No impact.	<u>Institutional</u> - o Specific institutional arrangements will have to be developed, since I/M is not within the current authority of any State or local agency. The California Department of Consumer Affairs would likely assume responsibility for the regulation and operation of these programs. Local government agencies' involvement is not anticipated. - o I/M programs can be directly administered by the State or franchised out to private contractors; due to the disproportionate demands on State administrative resources demonstrated by the South Coast Air Basin, a private-operated/public-monitored program may be preferable for the Bay Area. <u>Financial</u> Direct Public Cost of Implementation - o See column headed "Total Cost/Year of Recommended Action". Fiscal Effect on Local Government - o No impact.	<u>Production of Goods and Services</u> - o Implementation of I/M measures would add a new line of service for the California automotive service industry. Some services presently exist for identifying defective emission control equipment, but they are not universally applicable to all California registered vehicles. I/M programs for light-, medium-, and heavy-duty vehicles would offer a universally applied service program for identification and repair of vehicles with excessive emissions caused by maladjusted or defective emission control equipment. <u>Consumer Expenditures</u> - o I/M consumer costs are comprised of the inspection fee and related maintenance and repair costs which may be incurred. The inspection fee will probably not exceed \$15, and the average cost of repairs for the failed vehicle is approximately \$30. <u>Income and Investment</u> - o See private costs in the column headed "Total Costs/Year of Recommended Action." - o Improved maintenance may prolong vehicle life.	<u>Housing Supply</u> - o No impact. <u>Physical Mobility</u> - o Because of the increased cost of private transportation, the mobility of the limited income segment of the Bay Area population may be reduced, particularly for those in other than urban areas. <u>Health and Safety</u> - o The substantial reduction in emissions of carbon monoxide and hydrocarbons from this measure could produce substantial health-related benefits, particularly for high risk groups and those who experience the heaviest exposures while residing, working or shopping in urban centers. <u>Sense of Community</u> - o No impact. <u>Equity</u> - o Older vehicles generally need more extensive repairs; this may place a special financial burden on lower-income persons who are more likely to own older vehicles.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
II. STATIONARY SOURCE CONTROLS						
1. Tanker Ballasting: Use segregated ballast or washed ballast tank and inert gas system for tankers larger than 40,000 DWT	2.5	U.S. Coast Guard	A, I-1981	No direct costs	Administrative/ Regulatory -ad valorem tax revenues -ARB subvention funds -Federal Clean Air Act funds -permit fees	The Bay Area Air Quality Management District (BAAQMD) was created by the California Legislature in 1955. The Dis- trict structure, operating pro- cedures and authority are con- tained in Divi- sion 26 of the California Health and Safety Code.
2. Reciprocating Engines: Replace 2-cycle engines with 4-cycle; replace 4-cycle engines with electric motors where possible	4.0	Bay Area Air Quality Manage- ment District (BAAQMD)	A, I-1986	\$290,000	Operating/ Maintenance -private	
3. Gasoline Distribution: Lower exemption cutoffs to require Phase I, II controls at additional service stations	1.0	BAAQMD	A-1983 I-1984	\$180,000	Capital -private -California Pollution Control fi- nancing authority	
4. Pesticides: Ban weed oil; use water or other non-VOC carriers; limit overspray	3.7	BAAQMD	A-1985 I-1986	\$530,000	-Federal Small Business Ad- ministration loan programs	
5. Wood Furniture Coating: Use low solvent coatings and high transfer efficiency spray methods	1.1	BAAQMD	A-1983 I-1984	\$200,000		
6. Electronics Industry: Use condensation, adsorption, etc. to control solvent emissions	5.7	BAAQMD	A-1982 I-1983	\$3,800,000		
7. Organic Chemical Manu- facturing: Requires con- trol of VOC fugitive emissions from pumps, com- pressors, process vessel depressurization and pro- cess relief valves	0.3	BAAQMD	A-1983 I-1984	\$58,000		
8. Aerospace Assembly & Com- ponent Coating Operations: reformulate paints by con- verting to waterbased or high-solids paints or sub- stituting non-reactive sol- vents for reactive ones in conventional paints	0.5	BAAQMD	A-1982 I-1984	\$180,000		
9. Aerosol Cans: Use pump, stick or roll-on con- tainers or N ₂ /CO ₂ pro- pellants. Reduce VOC content/reactivity.	3.0	BAAQMD	A-1985 I-1986	\$600,000		
10. Coating of Plastics: Use low-solvent coatings or equivalent control by condensation, adsorption, incineration, etc.	2.0	BAAQMD	A-1984 I-1985	\$730,000		
11. Industrial Maintenance Coatings: Use low-solvent coatings for some indus- trial maintenance appli- cations	1.0	BAAQMD	A-1984 I-1985	\$370,000		
12. VOC Storage: Lower con- trol requirement cut-offs from 1.5 psia and 40,000 gallons to 0.5 psia and/or 10,000 gallons	3.0	BAAQMD	A-1984 I-1985	\$990,000		

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> - o See "Direct Benefits" column. <u>Water Quality</u> - o No impacts. <u>Physical Resources</u> - o Conservation of 10,000 to 12,000 gals/day of volatile organic compounds. (Approx. \$4 million per year.) - o Some rules (best available control technology) would consume construction materials, water, disposal facilities, etc. <u>Energy Resources</u> - o Use of BACT (5 or 6 measures) and, in some cases, lowest attainable emission rate (1 or 2) may result in a net energy penalty. <u>Public Facilities</u> - o No serious impact other than landfill sites which may use land owned by either public or private parties.	<u>Institutional</u> - o The governmental structure for implementing these control measures already exists in the Bay Area Air Quality Management District (BAAQMD) which actively enforces air pollution control programs in the Bay Area. The proposed amendments are an expansion of existing organic emission rules to cover new categories of sources, or are more stringent extensions of measures already in force for control of industrial and stationary sources of air pollution. <u>Financial</u> Direct Public Costs of Implementation - o See "1982 Costs of Recommended Control Actions" column; annualized costs of \$24 million to \$62 million per year. Fiscal Effects on Local Government - o Increased costs to BAAQMD may be 6% of District's budget, or \$600,000/year. Other local governmental costs are minimal except for landfill sites, which are not clear at this time. The governmental structure for the implementation of these control measures already exists in the Bay Area Air Quality Management District, as mentioned above.	<u>Production of Foods and Services</u> - o Increased technological dependence by the Bay Area industrial sector to improve regional air quality will require substantial capital investment. In some instances, these added restrictions and costs will adversely affect the competitive position of local industries inter-regionally where the cost of these investments may be passed on to the consumers. - o Measures pertaining to coatings, waste disposal and consumer solvents will require that process changes occur in order to reduce levels of air pollution. Changed product composition resulting from different processes may cause reduced durability and increased liability potentials. Phased implementation of this program may help minimize these problems. - o Special consideration may be needed for the food processing industry in meeting health standards. <u>Consumer Expenditures</u> - o Direct costs of implementing these measures will initially fall upon industry but eventually be paid by the consumer and local taxpayer. This type of expenditure will not increase productivity but cause inflationary activity. Also, higher prices for Bay Area products may cause non-Bay Area consumers to look elsewhere for the same product. In either case, the proposed controls will result in increased cost of consumer goods.	<u>Housing Supply</u> - o No impacts. <u>Physical Mobility</u> - o No impact. <u>Health and Safety</u> - o Air quality standards for each of the pollutants are based upon scientifically derived air quality criteria. Air quality criteria are an expression of current information concerning the relationship between various concentrations of pollutants in the air and their adverse effects on man and his environment. The control measures being proposed are designed to meet the standards, i.e., to reduce the concentration of various pollutants in the air. Pollutant concentration reductions from the air will reduce potentially adverse effects from these substances, thereby favorably impacting public health. - o With regard to safety, the stationary source control program may eliminate many hazards associated with the use and storage of combustible solvents. <u>Sense of Community</u> - o No impact. <u>Equity</u> - o A major question of equity involves the competitive position of Bay Area industries that are placed under the restrictions and controls proposed. Employment opportunities created in local industries producing air pollution control equipment will not offset increased unemployment resulting from the competitive disadvantage (see "Production of Goods and Services"). The willingness of EPA and CARB to require similar measures outside of the Bay Area is of obvious concern to the region.
		<u>Income and Investments</u> o See column "1982 Costs of Recommended Control Action."	

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPLE- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
II. STATIONARY SOURCE CONTROLS (Cont'd.)						
13. Large Commercial Bakeries: Control oven VOC emissions from large commercial bakeries	1.1	BAAQMD	A-1985 I-1986	\$400,000		
14. Marine Lightering: Use deep draft lighter vessels to reduce VOC emissions.	0.6	U.S. Coast Guard	A-1985 I-1986	\$220,000		
15. Zero Gap Seals on Floating Roof Tanks: Install "zero gap" seals on most floating roof tanks	1.5	BAAQMD	A-1984 I-1985	\$22,000		
16. Polymer & Resins Manufacturing: Use condensation, adsorption to control VOC emissions from reactor vessels, etc.	0.2	BAAQMD	A-1984 I-1985	\$120,000		
17. Rubber /Plastic Products Manufacturing: Use condensation, adsorption or incineration to control VOC emissions from molding, curling, cementing, etc.	1.1	BAAQMD	A-1984 I-1985	\$640,000		
18. Coatings Manufacturing: Requires control of VOC emissions from reactors, blenders, mixers, and transfer and storage	0.2	BAAQMD	A-1984 I-1985	\$150,000		
19. Natural Gas & Crude Oil Production: Requires control of VOC emissions from valves, flanges, pumps, compressors, relief valves and storage tanks	1.6	BAAQMD	A-1983 I-1984	\$440,000		
20. Sanitary Landfill Sites: Install gas collection systems to be combusted directly or separated into a saleable methane portion and non-methane portion to be incinerated	7.2	BAAQMD	A, I-1983	\$9,500,000		
21. Vegetable Oil Manufacturing: Use mineral oil scrubber and proper maintenance/operation per draft EPA CTE for extractors, desolventizers, dryers, coolers and conveyers	0.4	BAAQMD	A-1984 I-1985	\$150,000		
22. Volatile Organic Waste Disposal: Strip and recover VOC from wastes prior to disposal	6.0	BAAQMD	A-1983 I-1985	\$5,200,000		

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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See preceding page.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
III. TRANSPORTATION CONTROLS						
1. Reaffirm commitment to 28% transit ridership increase between 1978 and 1983.	Included in 1979 Air Quality Plan - no additional credits are claimed.	Metropolitan Transportation Commission (MTC), transit districts.	Measure is currently being implemented, with a 26% increase in ridership resulting in the first 3-year period.	Included in Transportation Improvement Program - no additional costs.	-Federal Mass Transportation Assistance Program -Fare Revenues	-Local Transit District Enabling Legislation -MTC Enabling Legislation
2. Support post-1983 improvements identified in public transit operators' 5-year plans; after consultation with the operators, adopt ridership increase target for 1983-1987.	Hydrocarbons: 0.6 Carbon Monoxide: 7.3 Nitrogen Oxides: 1.0		A-1982 I-continuing	Costs of maintaining existing level of services is currently programmed in regional allocations. Ridership increases would come from productivity improvements, thus additional costs would be moderate.	-Local Transportation Development Act Funds -State Mass Transportation Assistance Programs -Toll Bridge Revenues	
3. Seek to expand and improve public transit beyond committed levels.	Hydrocarbons: 0.3 Carbon Monoxide: 3.8 Nitrogen Oxides: 0.5		MTC seeks new sources of revenue on an ongoing basis; if funding exists, transit operators implement plans to expand services.	Transit operators have submitted capital requests for FY83-87; of these, \$119.4 million cannot be funded with currently anticipated revenues. Additional funds would also be needed for operating subsidies. However, this measure has other benefits so the costs cannot be solely attributed to air quality.		
4. Continue to support development of high-occupancy-vehicle (HOV) lanes.	Depends on specific project. Emission credits would not be allowed for specific projects until environmental studies were completed and funds were programmed.	Caltrans, cities and counties	A-1979 I-varies with the project	Varies by specific project; since these projects have other benefits, the costs cannot be solely attributed to air quality.	-Federal Aid Highway Programs -State Highway Program Funds	-Caltrans enabling legislation -Local planning and traffic control enabling legislation
5. Continue to support RIDES efforts; carpool matching and vanpooling.	Emissions credits already included in 1979 Plan - no additional credit is claimed.	RIDES, MTC, Caltrans	A-1979 I-continuing	Funds are already programmed; no additional costs are associated with this measure.	-Federal Aid Highway Programs -State ride-sharing funds	-Caltrans enabling legislation -RIDES charter -MTC enabling legislation
6. Continue efforts to obtain funding to support long range transit improvements (including a light rail line in the Guadalupe Corridor and various BART extensions).	It is likely that none of the projects included in this measure can be implemented prior to 1987, hence no emissions credits are claimed.	MTC, transit districts	A-1979 I-continuing	Project design costs over the next 5 years total \$35 million; construction costs of the Guadalupe project over the next 5 years is \$181 million. ¹	Same as #1.	Same as #1.
7. Reaffirm commitment to preferential parking program: opening more fringe parking lots and free vanpool parking areas.	Emissions credits already included in 1979 Plan - no additional credit is claimed.	Caltrans	A-1979 I-continuing	Costs already included in the Transportation Improvement Program; no additional costs are associated with this measure.	Same as #5.	-Caltrans enabling legislation

1. Due to the range of benefits from these measures the costs cannot be attributed solely to air quality.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> - o See "Direct Benefits" column. <u>Water Quality</u> - o No impact. <u>Physical Resources</u> - o No impact other than the reduction in damage to vegetation and man-made materials associated with lower pollutant emissions. <u>Energy</u> - o Gasoline savings estimated to be 18-19 million gallons/year from carpooling, the shift to transit, improved traffic flow, and the shift to bicycles.. - o Minor increase in transit fuel consumption. <u>Amenities</u> - o Cleaner air. - o Improved pedestrian environment in auto-control zone.	<u>Institutional</u> - o Organizational and governmental structures necessary to implement these measures are already in existence and, as these are continuations of previously adopted measures, progress in their implementation is already ongoing. <u>Financial</u> - o Certain measures, notably the additional transit services, bus/carpool lanes, and bicycle systems, are rather costly. There is some funding available, but additional funds will be needed. - o Other measures would generate revenue which could be used to finance the incentives mentioned above.	<u>Production of Goods and Services</u> - o New employment in the transit sector. - o Possible adverse effect on parking lot operators. <u>Consumer Expenditures</u> - o Increase in cost of operating private autos. - o Savings to those commuters utilizing carpools, vanpools or transit.	<u>Housing Supply</u> - o No impact. <u>Physical Mobility</u> - o Additional transit service would increase mobility of all transit users. - o Carpool/vanpool measures would increase travel options for most commuters. - o Some restriction on private auto access in the auto control zone. <u>Health and Safety</u> - o Reduction in auto accidents with improved peak period flow. - o Exercise benefits for those who bicycle. - o Possible increase in number, but not rate, of bicycle accidents with increased usage. <u>Sense of Community</u> - o No impact. <u>Urban Patterns</u> - o The combination of incentives like additional transit service and disincentives on private auto use will encourage a more compact land use pattern, with employees living closer to transit lines and/or their jobs. - o Pricing disincentives will impact primarily middle income commuters who choose to continue driving their cars.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
III. TRANSPORTATION CONTROLS (Cont'd.)						
8. Encourage transit operators to work with Caltrans to identify underutilized lots along major transit lines which could be used as park-and-ride lots.	Hydrocarbons - <0.1 Carbon Monoxide - 0.5 Nitrogen Oxides - 0.1	Caltrans, Transit districts	A-1979 I-continuing	Equivalent annual cost of this measure is \$22,850.	-State Highway Program funds	Same as #7.
9. Continue present Commute Alternatives Program: informing employers of transportation alternatives and training commute coordinators within a firm to promote the goals of the program.	Hydrocarbons - 0.1 Carbon Monoxide - 0.9 Nitrogen Oxides - 0.1	MTC	A-1979 I-continuing train 30 com- mute coordina- tors each year	Equivalent annual cost is \$35,420.	-Federal Mass Transit As- sistance Programs -Local Trans- portation Development Act funds -State Rideshar- ing funds	-MTC enabling legislation
10. Encourage cities to change regulations to decrease parking requirements for employers who encourage car/vanpooling.	Hydrocarbons - 0.1 Carbon Monoxide - 1.5 Nitrogen Oxides - 0.2	MTC, cities and counties	A-1979 I-continuing	Equivalent annual cost is \$13,700 ¹	-Local Trans- portation Development Act funds -City General Funds	-Municipal zoning enabling legis- lation
11. Complete the bicycle element of the MTC Regional Transportation Plan: Implement plans to facilitate bicycle usage.	Hydrocarbons - 0.4 Carbon Monoxide - 5.4 Nitrogen Oxides - 0.1		A-1982 I-1982-84	Equivalent annual cost is \$2,100,000 ¹	-Local Trans- portation Development Act funds	-TDA legislation
12. Continue MTC Commute Alternatives Program and place additional emphasis on flextime program which allows employees to choose travel times, hence avoiding congestion.	Hydrocarbons - 0.4 Carbon Monoxide - 5.0 Nitrogen Oxides - 0.3	MTC	A-1979 I-continuing	Equivalent annual cost is \$13,800 ¹	Same as #9.	Same as #9.
13. Encourage cities to use CEQA review procedures to restrict the development of commercial drive-through facilities.	Hydrocarbons - 0.1 Carbon Monoxide - 1.3 Nitrogen Oxides - <0.1	MTC, cities and counties	A-1979 I-continuing	No additional costs are asso- ciated with this measure.	-MTC planning funds -City General Funds	-Municipal zoning enabling legis- lation -California En- vironmental Quality Act
14. Encourage large delivery fleet operators to restrict vehicle idling either through company policy or the use of vehicle controls.	Hydrocarbons - <0.1 Carbon Monoxide - 0.1 Nitrogen Oxides - <0.1	MTC, fleet operators	A-1979 I-continuing	Equivalent annual cost is \$4,100.	-MTC planning funds -Private funds	-MTC enabling legislation
15. Disseminate information on the economic and technical benefits of alternative engines and fuels to fleet operators in the Bay Area.	Hydrocarbons - <0.1 Carbon Monoxide - 0.1 Nitrogen Oxides - <0.1		A-1982 I-1982-84	Equivalent annual cost is \$4,100.		

¹ Due to the range of benefits from these measures the costs cannot be attributed solely to air quality.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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See preceding page.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
IV. ADMINISTRATIVE PROGRAMS						
1. Advisory Review of Projects and Plans: This program is directed toward new or modified facilities, both public and private, and plans that could result in significant impacts on air quality. The three co-lead air quality planning agencies would review plans and proposals and issue comments related to minimizing their adverse air quality impacts as early in the planning stages as possible. The existing California Environmental Quality Act environmental document process would be used as the primary vehicle for receiving information and communicating advisory comments.	Unknown	Association of Bay Area Governments, Metropolitan Transportation Commission, Bay Area Air Quality Management District	A, I-1982	Unknown	-co-lead air quality planning agencies, existing budgets	-Under CEQA any interested parties may participate in the review-and-comment process -This process, being strictly advisory, would not require further legal authority
2. Conformity Assessment of Federally-Supported Activities: As the area-wide clearinghouse for all Federal grant applications, ABAG's Executive Board comments on Federal grant applications for conformity with regional policies, including provisions of the air and water quality management plans. Hence, assessment of conformity with the provisions of Sections 176(c) and 316 of the Clean Air Act would be formally incorporated into this process. Section 176(c) mandates that agency activities be in conformity with approved plans, and Section 316 outlines the consequences of failure to do so.	Unknown	Association of Bay Area Governments	A, I-1982	Unknown	-existing budgets	-Authority for grant application clearing-house responsibilities comes from the Federal Intergovernmental Cooperation Act and the Federal Demonstration Cities and Metropolitan Development Act
3. Comprehensive Transportation Plan and Air Quality Analysis of Oakland Central Business District (CBD) Development: Downtown Oakland is currently projected to experience significant growth in the Central Business District which may have adverse impacts on traffic circulation and local air quality. Even with an Inspection/Maintenance Program, the Federal 8-hour CO standard may ultimately be exceeded. Therefore, a study of the collective impacts of this growth on traffic circulation and transit use, which will result in the development of mitigation strategies, is recommended as an action that the City of Oakland should undertake.	Unknown - Carbon monoxide levels are of concern	City of Oakland, ABAG, BAAQMD, and MTC	A-1982 I-1983	Unknown	-City of Oakland to fund the transportation assessment portion with ABAG, BAAQMD, and MTC assisting in preparation of the air quality assessment	-None needed

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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The environmental impacts of these programs is difficult to assess at this time in other than general terms.

As the programs involve prevention of adverse effects on environmental quality (including air, water, energy, physical resources, etc.) through studies, advisory review and conformity assessment, it is anticipated that substantial environmental benefits could result. These benefits are heightened by the fact that the programs result in a comprehensive analysis of both the individual and collective impacts of regional activities with environmental consequences, rather than fragmented analyses and recommendations from several different agency review processes. Thus, the reviewer benefits by advice and assessments, and the reviewers benefit by focusing on major environmental problems together.

Institutional

- o Both of the first two administrative programs utilize institutional structures and policies that are already in existence, and into which these proposed activities fit easily
- o Where necessary, special relationships would be established with local jurisdictions having air pollution control problems which require individual attention, such as the Oakland CO problem targeted by the third proposal.

Financial

- o As the first two proposed administrative activities are merely more formalized versions of activities that are currently being done by the agencies indicated, there would be no impact on their financial resources.
- o The impact study of the Oakland CBD would require city funds, which would likely be diverted from other potential uses.

As with the environmental impacts, the economic and social impacts of these programs is difficult to assess at the outset. The existence of coordinated, comprehensive regional plans whose purpose is to minimize adverse and maximize positive effects on economic, social and environmental resources provides a framework within which these two administrative programs will function. Consequently, the review process and comments utilized on these programs will reflect these adopted regional policies and will result in minimal negative and maximal positive impacts on the various resources of concern.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
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V. ADDITIONAL MEASURES RECOMMENDED BY THE JOINT AIR QUALITY PLANNING AND ADVISORY COMMITTEE FOR CONSIDERATION IN THE PLAN

1. Mandatory Indirect Source Review: Would require review of development projects which generate or attract traffic in order to introduce mitigation measures which reduce traffic congestion and minimize air quality impacts as early in the planning process as possible. This mandatory process would replace "Advisory Review of Projects and Plans" for indirect sources (those which produce no significant air contaminant emissions themselves, but do attract directly-polluting sources such as increased traffic density) above specified size criteria.	Not quantifiable at this time; reductions could approach 50% of those estimated for the "Compact Growth Scenario"	BAAQMD	A, I-1983	Unknown	Existing budgets	Existing authority contained in California Government Code, Health and Safety Code, State Constitution and relevant Federal legislation.
2. Land Use Control Measures: As these measures were assessed in the previous EIR, only the general policies will be summarized here - refer to Appendix C for more complete information on specific actions to implement these policies.	Unknown	Cities, counties, Local Agency Formation Commissions, special districts, ABAG, MTC, BAAQMD, State Water Resources Control Board, California Department of Transportation, U.S. Department of Transportation, Environmental Protection Agency	A, I-variable	Direct administrative and regulatory costs to be estimated when agencies specify actions they will take to carry out recommendation for compact development.	Depends on specific actions.	Existing authority contained in California Government Code, Health and Safety Code, State Constitution and relevant Federal legislation.
a. Extend new development only to those locations with existing sewer and water service or sewer and water service committed in capital improvement programs.						
b. Restrict development outside urban service areas in areas of critical environmental concern (environmental resources, hazards or amenities).						
c. Develop unimproved land within urban service areas where urban services exist or are committed in capital improvement programs.						
d. Complete, as soon as possible, all needed sewer, water or transportation improvements within adopted urban service areas.						

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
The environmental, economic and social impacts of a mandatory indirect source review process are difficult to assess at the outset. In general, however, the intent of the review process would be to predict and mitigate negative impacts in each of these three areas. As a result, it is possible that some accommodations to development plans would have to be made and, depending upon the nature of the accommodation, a range of impacts are possible. While it is not possible to predict these now, the review and comment process would deal with them as they are identified. This measure would help to achieve attainment and long term maintenance of Federal standards for carbon monoxide, ozone and particulates. To the extent that this preventive approach is successful, benefits to the environment, economy and society would be produced.	<u>Institutional</u> - o Cooperation of local governments and transit agencies would be essential for effective implementation of some mitigation measures. - o Implementation would require either the creation of a new category of Authority to Construct permits to be issued to applicant developers by the BAAQMD, or as an alternative mechanism, each city and county in the District could amend its building permit regulations to include air quality requirements according to uniform standards (in this case, local applications would be reviewed by BAAQMD or by the three co-lead air quality planning agencies; comments on the permits would then be forwarded to the cities and counties for their final permit actions).	See "Environmental Impacts" statement	
<u>Air Quality</u> - o See "Direct Benefits" Column. <u>Water Quality</u> - o Would provide greater preservation of outlying area watersheds, estuarine systems and groundwater recharge areas. - o Would lower per capita consumption rates of municipal and domestic water supplies due to increased development densities (e.g., smaller lawns, etc.). - o Would provide regionwide reduction in surface runoff pollution due to less impervious surface coverage (streets, highways, rooftops, etc.). - o Would mean higher localized surface runoff pollution in urban areas due to increased densities.	<u>Institutional</u> - o Would mean significant changes in planning and zoning administration-related activity (e.g., amendment of regional and local general plans, zoning ordinances and subdivision regulation revisions, etc.). - o Greater coordination would be needed among local agencies whose decisions affect development. - o Would require increased governmental coordination and technical support to facilitate local action. <u>Financial</u> - o Greater use of excess capacity in urban public service facilities (e.g., sewers, schools, etc.) may result in lower user charges, taxes, etc. - o Would mean a major reduction regionwide in capital construction costs due to limited extension of public services (e.g., highways, sewer collectors, water lines, etc.). - o More efficient solid waste collection due to higher densities could result in lower collection costs. - o Would increase tax base for urban areas. - o Individual property tax assessments may increase, then level off. - o Sales tax revenue would be increased in urban centers. - o Increased government administration costs would be expected. - o Fee and user charges may increase in certain outlying areas.	<u>Production of Goods and Services</u> - o Would be conducive to increased transit service. - o Would increase transit-related employment. - o Would increase job opportunities in urban areas. - o Would increase commercial activities in urban areas. - o Would mean less commercial growth in outlying areas. <u>Income and Investment</u> - o Would lower regionwide demand for investment due to reduced public capital requirements. - o Would shift emphasis of public and private financial investment from outlying areas to urban areas for renovation and replacement. - o Would stimulate housing rehabilitation and maintenance industries. - o Would stimulate higher density residential production. - o May affect housing industry profit/cost structure. - o Residential land prices would increase in the urban centers and close-in areas (e.g., increased site preparation costs for bypassed land) and decline in outlying areas beyond urban services. - o Industrial land prices not significantly impacted due to large industrial land supply within urban areas.	<u>Housing Supply</u> - o Would increase conversions of older urban area single-family structures. - o Would lower proportion of substandard units regionwide due to rehabilitation and redevelopment efforts. - o May cause temporary lag in new residential construction in urban areas as builders adjust to zoning and subdivision regulation changes. - o Would reduce new residential construction in outlying areas within the region. - o Would increase new construction and rehabilitation activity throughout urban areas, particularly older development areas.
<u>Physical Resources</u> - o Less conversion of undeveloped land to urban uses would increase regionwide preservation of critical environmental areas (e.g., prime agricultural lands, ecological habitats such as marshes, steep slopes and flood-prone areas). - o Would reduce conversion of agricultural land to urban uses. - o Would reduce damage to flora and fauna due to lower pollutant concentrations. - o Could reduce conversion of mineral, timber, quarry and geothermal areas to urban uses. - o Could increase development pressure on land uniquely suited for special development purposes in urban areas (e.g., airports, parks). (continued, next page)		(continued, next page)	<u>Physical Mobility</u> - o Could increase transit availability for all trip purposes (e.g., work, school, recreation, shopping, etc.) and for transit-dependent residents. - o Would increase pedestrian activity as urban services are brought within closer proximity. - o Would reduce regionwide total vehicle miles traveled. - o Would mean shorter trips by automobile resulting in increased travel time savings. - o Local traffic congestion may increase as local streets are used more. - o Would mean greater inconvenience for private automobile uses (e.g., parking might be more difficult to find). (continued, next page)

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
e. Improve highway, street, road and transit systems consistent with local actions to stage land development. f. Increase housing and job opportunities in existing urbanized areas by encouraging public and private rebuilding into compatibly mixed commercial, industrial and residential land uses. g. Encourage "infill" development of bypassed vacant land within urban service areas. h. Develop at higher densities within service areas where existing or committed urban service capacities, including transit, can support the higher densities. i. Limit development of land within urban service areas where soil, slope or other conditions can support only low-density development. j. Improve the balance of jobs and housing in jurisdictions throughout the region to reduce the necessity for long distance home-to-job travel. k. Mix residential/commercial and industrial development in communities throughout the Bay Region. l. Discourage new large-scale land development projects that are exclusively commercial, industrial or residential, unless such projects clearly demonstrate that they improve the overall balance of jobs and housing in that city, county or subregion. m. Fund new wastewater and transportation facilities only after areas served have taken actions to carry out actions of this plan.	Unknown	Cities, counties, Local Agency Formation Commissions, special districts, ABAG, MTC, BAAQMD, State Water Resources Control Board, California Department of Transportation, U.S. Department of Transportation, Environmental Protection Agency	A, I-variable	Direct administrative and regulatory costs to be estimated when agencies specify actions they will take to carry out recommendation for compact development.	Depends on specific actions.	Existing authority contained in California Government Code, Health and Safety Code, State Constitution and relevant Federal legislation.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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Energy

- o Would reduce gasoline consumption due to less automobile travel.
- o Would increase consumption of transit-related fuel.
- o Would provide overall reduction in transportation fuel consumption.
- o Would lower per unit household energy consumption.

Amenities

- o Would preserve scenic areas.
- o Would improve visibility regionwide.
- o Would increase numbers of people exposed to noise levels of urban areas.

Consumer Expenditures

- o Could increase housing prices and rents for a short time due to any production lags as builders adjust to zoning and subdivision regulation changes.
- o Would reduce increases in residential waste collection charges.
- o May cause increases in urban area property taxes to support services to new development and because of increased land values.
- o Would reduce increases in residential and commercial energy charges.
- o Could mean more disposable income due to lower transportation costs.
- o May shift housing demand outside Bay Area
- o May affect consumer housing preference.

Health and Safety

- o Would significantly improve public health due to reduced oxidant concentrations regionwide.
- o May cause greater exposure to localized CO pollutant concentrations, depending on the success of technological controls and the amount of increase in use of transit.
- o Could increase pedestrian safety problems on local streets.

Sense of Community

- o Would enhance neighborhood identities due to diversity and density of activity.
- o Adverse social effects may result from higher density development.
- o Would increase time for non-work activity due to shorter commutes.

Equity

- o Could expand transit availability for transit-dependent residents.
- o Would broaden housing opportunities if lower per dwelling unit costs are passed on to residents.
- o Rehabilitation and redevelopment would probably displace poor, aged, minority and handicapped residents.
- o Budgets of those on low- and fixed incomes may be adversely affected due to possible cost of living increases in renewed areas.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION -I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
n. Review development proposals for air quality effects and consistency with compact development recommendations in the plan. (Indirect Source Review) o. Adopt financial programs to support local and regional agency actions and private sector development actions consistent with policies in this chapter to reduce home-to-work distance and auto dependency. p. Adopt a coordinated regionwide program for carrying out actions for attainment and maintenance of air quality standards through development and land use management actions by cities, counties, special districts, ABAG, BAAQMD, MTC, LAFCOs, and other appropriate local and regional agencies.	Unknown	Cities, counties, Local Agency Formation Commissions, special districts, ABAG, MTC, BAAQMD, State Water Resources Control Board, California Department of Transportation, U.S. Department of Transportation, Environmental Protection Agency	A, I-variable	Direct administrative and regulatory costs to be estimated when agencies specify actions they will take to carry out recommendation for compact development.	Depends on specific actions.	Existing authority contained in California Government Code, Health and Safety Code, State Constitution and relevant Federal legislation.
3. Public Support for Transit:	See Transportation Control Measures.					
4. Additional Transportation Measures to be Identified by the California Air Resources Board: Consideration of future transportation measures identified by the CARB should be given in local planning efforts.						

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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See preceding page.

SECTION II

BACKGROUND OF THE PLAN

The 1979 Bay Area Air Quality Plan was adopted in January 1979 (and subsequently modified in May 1979) and forwarded to the State for incorporation into the State Implementation Plan (SIP). The Bay Area, as defined by the air quality planning boundary shown in Figure 2, was designated under the 1977 Clean Air Act to be a Non-attainment Area for ozone (O_3), carbon monoxide (CO), and total suspended particulates (TSP). The 1979 Plan was prepared in response to the Non-attainment Plan requirements contained in the Act. Following State and federal EPA reviews, it was determined that the 1979 Plan satisfied federal requirements with one major exception: there was no legal authorization for implementation of a motor vehicle inspection and maintenance program.

This document describes revisions to the 1979 Plan that are necessary to solve the Bay Area's air quality problems. The plan addresses air quality standards set by the federal government to protect public health. The plan proposes a range of controls to meet these standards and sets forth an approximate time schedule for adopting and implementing the proposals if the deadlines, as described in the Clean Air Act Amendments of 1977, are to be met.

OZONE

In the 1979 Plan, the Livermore Regional Air Quality Model (LIRAQ) was used to identify a hydrocarbon emissions level of 572 tons per day as the emissions level that would result in attainment of the one-hour .12 ppm federal ozone standard. LIRAQ also indicated that reductions in NO_x emissions would result in increased levels of ozone, therefore no NO_x control programs were included in the 1979 Plan.

In order to achieve a hydrocarbon emissions level of 572 tons, a reduction of 247 tons from the projected 1985 inventory was needed. Table 2 summarizes the programs in the Plan and their expected emission reductions.

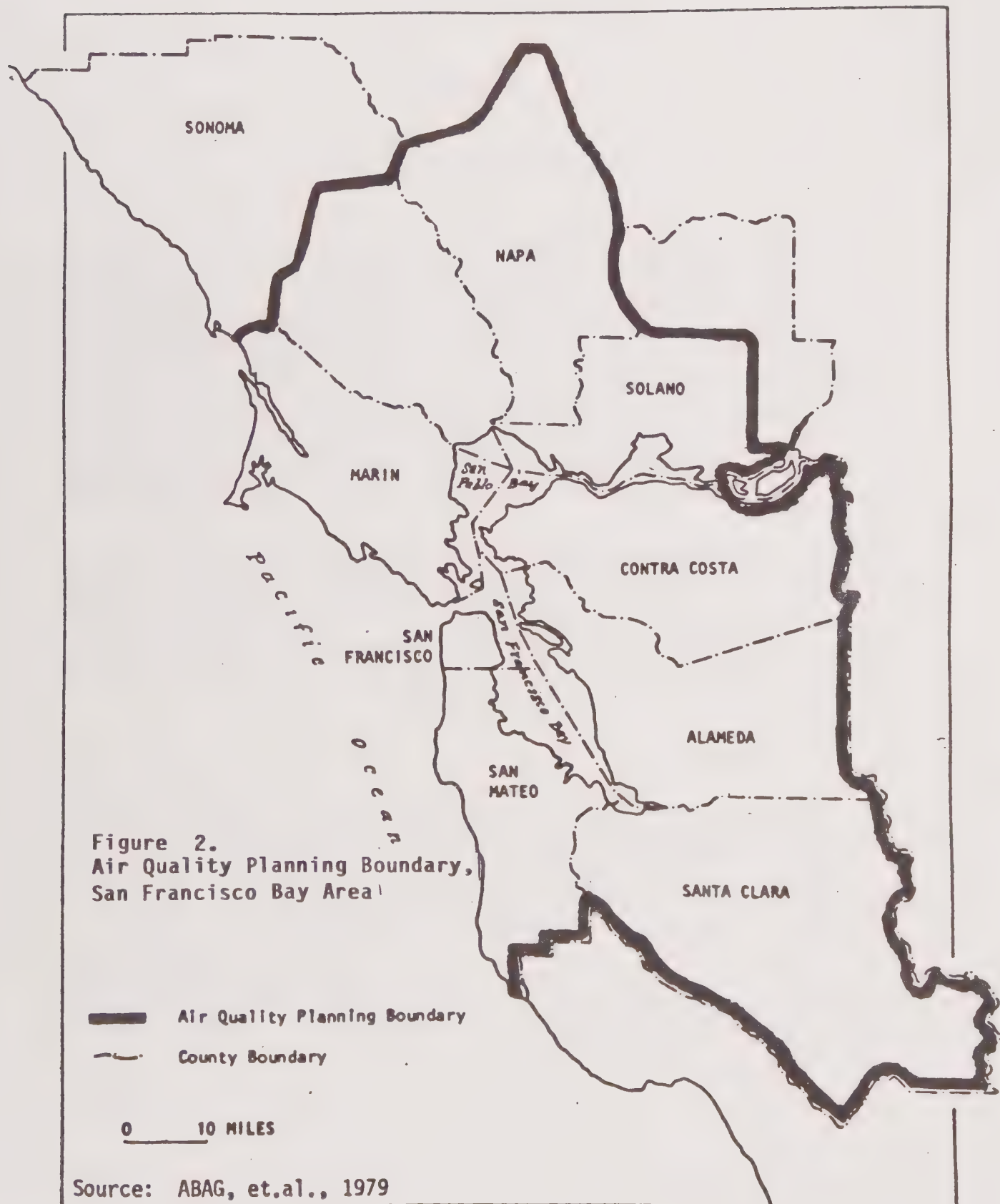


TABLE 2. SUMMARY OF HYDROCARBON EMISSION REDUCTIONS
FROM THE 1979 BAY AREA AIR QUALITY PLAN

Control Program	Projected 1985 Hydrocarbon Emission Reduction
o Use of available control technology on existing stationary sources	225 tons/day
o New source review	32 tons/day
o Motor vehicle inspection and maintenance	23 tons/day
o Transportation system improvements	<u>5 tons/day</u>
Total	285 tons/day

The total emission reduction of 285 tons/day projected from these programs was greater than the amount projected to be necessary for attainment of the ozone standard for two reasons:

- o The California Air Resources Board staff had questioned the emissions estimates for certain source categories based on data that they had recently collected. Since resolution of the issue was expected to require lengthy reexamination and comparison of the data, it was agreed that an allowance for uncertainty of 18 tons/day would be incorporated into the plan.
- o New Source Review was a controversial program at the time and many feared that it would stifle industrial growth in the region. In response to those fears, a growth increment of approximately 20 tons/day was incorporated into the plan. The California Air Resources Board agreed with this under the principal condition that three years of "reasonable further progress" would have to be demonstrated (1979-1981) before the growth increment could be used.

CARBON MONOXIDE (CO)

In the case of carbon monoxide, a linear rollback analysis based on the total Bay Area inventory of CO emissions was used to define the emission reduction requirement. This type of analysis was considered extremely crude, and CO hot spot monitoring was identified as an important task for future work. It was hoped that the additional monitoring would serve to better define the nature and extent of CO problems in the Bay Area. Based on the linear rollback analysis, it was concluded that the programs adopted to reduce hydrocarbon emissions (particularly motor vehicle inspection and maintenance) would also be sufficient to meet the federal 8-hour CO standard of 10 mg/m³ (9 ppm) by 1985.

TOTAL SUSPENDED PARTICULATES (TSP)

In November 1980, the Bay Area adopted a plan for TSP and forwarded that plan to the State and EPA for approval. The TSP plan indicated that excesses of the federal secondary TSP standard in Santa Clara County were apparently caused by "fugitive dust." Fugitive dust emissions occur from a variety of activities, including construction and demolition, and from motor vehicle travel over paved and unpaved roads. Fugitive dust emissions are difficult to control with current state-of-the-art methods, so the plan called for continued research. It also called for reductions in vehicle-miles-traveled in the San Jose Central Planning Area and consideration of a fugitive dust control rule by the Bay Area Air Quality Management District (BAAQMD).

The Environmental Protection Agency recently acted to approve the TSP plan (47 Federal Register 13140, 3/29/82). EPA has disapproved of the 1979 Plan for ozone and CO due to the lack of legal authority to implement the vehicle inspection and maintenance program (47 Federal Register 11866, 3/19/82). Despite numerous attempts over the past decade, the California Legislature has not yet been able to agree on an I/M program for the State.

ANNUAL REPORT FOR 1980

In July 1981, ABAG, BAAQMD, and MTC published the San Francisco Bay Area Annual Air Quality Report for 1980. This report summarized the progress made during 1980 to implement the 1979 Plan. The report indicated that:

"Except for motor vehicle inspection and maintenance, all of the programs adopted in the 1979 Bay Area Air Quality Plan (as modified in May 1979) are being implemented as scheduled. Emissions continued to be reduced in 1980, and substantial further reductions are expected in future years. Air quality in general has improved; however, in the case of ozone the number of days exceeding the federal standard increased slightly in 1980 (compared with 1979).

"At present, we may conclude on the basis of guidelines specified by EPA, that reasonable further progress based on emissions is being made toward attainment of federal air quality standards in the Bay Area. A substantive technical demonstration of this conclusion is not possible at this time due to difficulties in comparing the revised emission inventory estimates with those contained in the 1979 Plan.

"Ambient air quality data suggest that improvements in ozone air quality are not occurring as rapidly as the reduction in hydrocarbon emissions, and this potential divergence of the two trends will be carefully tracked in future annual reports. Ambient carbon monoxide hotspot monitoring data have confirmed that on a localized basis, CO problems are more severe than originally reported in the 1979 Plan.

"The 1982 Plan will include a detailed reevaluation of future air quality and any alternative additional control programs that may be needed."

INSTITUTIONAL ORGANIZATION FOR PLAN PREPARATION

The institutional organization for the preparation of the 1982 Plan relied heavily upon the mechanisms and procedures developed for the preparation of the 1979 Plan. ABAG, BAAQMD and MTC are the co-lead agencies for air quality planning in the Bay Area. Responsibilities for conducting future planning tasks were assigned in a joint memorandum of understanding between ABAG, BAAQMD and MTC. The process for both technical and policy evaluation for this plan was similar to the process successfully used in the preparation of the 1979 Plan. Key working groups and their responsibilities for air quality planning in the Bay Area are summarized below:

- o Joint Technical Staff - composed of staff members from ABAG, MTC, BAAQMD, ARB, EPA and the California Department of Transportation (Caltrans). This group was responsible for the development of alternative control strategies and the technical assessment of their effectiveness and impacts.
- o Modeling Committee - composed of staff members with specialized air quality modeling expertise from ABAG, MTC, BAAQMD, Caltrans, ARB, EPA, Lawrence Livermore Laboratory (LLL), and Systems Applications, Inc. (SAI). This group was responsible for specification of the air quality modeling methods to be used, and review of the results obtained.
- o Air Quality Advisory Committee - composed of interested individuals from private industry, local government staff, and special interest groups. This committee is the vehicle by which progress on plan preparation is communicated to interested individuals and organizations that are not participating directly in the effort. It provides a formal and continuous opportunity for such individuals to

communicate concerns and comments on the work being done, both to staff and the various policy bodies who will be reviewing the plan.

- o Joint Management Committee - composed of executive staff of ABAG, MTC, and BAAQMD. This group provides key administrative and policy guidance to the Joint Technical Staff and serves as a bridge between technical staff and the policy review bodies.
- o Joint Air Quality Planning and Advisory Committee (JAQPAC) - This nine-member committee has been established to coordinate policy on regional air quality planning, pursuant to the Memorandum of Understanding between ABAG, BAAQMD, and MTC. It is composed of three members from each of the governing bodies of the three co-lead air quality planning agencies for the Bay Area. The JAQPAC has broad responsibility to discuss and recommend solutions to any SIP-related issues, conflicts, problems or policy questions that may arise between or among the agencies. The JAQPAC will make recommendations to the respective governing bodies with regard to SIP-related reports or activities.
- o ABAG Regional Planning Committee (RPC) - This committee is composed of elected representatives of cities and counties in the Bay Area, and representatives of special and public interest groups. It functions as the principal policy review body in ABAG for plan development, inheriting the role of ABAG's Environmental Management Task Force.
- o ABAG Executive Board - This group is composed of elected representatives of cities and counties in the Bay Area, and functions as the month-to-month governing board for ABAG. All plans and matters of regional policy produced by ABAG must be reviewed and approved by the Board.
- o Metropolitan Transportation Commission (MTC) - This group is composed of representatives of cities and counties in the Bay Area, and functions as the governing board for MTC. All plans, funding priorities and policies related to transit and major transportation projects must be reviewed and approved by this Commission.
- o BAAQMD Board of Directors - This group is composed of elected representatives of counties in the Bay Area, and functions as the governing board of the BAAQMD. The activities and regulations of the District must receive approval from this Board.
- o California Air Resources Board - This body is composed of individuals appointed by the Governor and has the authority to set motor vehicle emission standards. It is also responsible for preparation and submittal of the State Implementation Plan for California to EPA. In addition, it

can override the authority of local air pollution control districts, such as the Bay Area Air Quality Management District, in regulating emissions from stationary sources.

THE 1982 PLAN REVISION

The 1977 Clean Air Act Amendments require those regions which will not attain the ozone and/or carbon monoxide standards by 1982 to submit a revision to their state implementation plan by July, 1982. The focus of this effort in the Bay Area has been in the following areas:

- o Updating plan assumptions - In the time since the 1979 Plan was adopted there have been changes in stationary and mobile source emission factors. The energy situation has also changed substantially. In addition, the air quality and travel models have been updated and refined. All of these changes have been incorporated in the plan revision.
- o Reviewing implementation of adopted controls - The adopted controls have been reviewed to determine their expected effectiveness by 1987.
- o Analyzing new controls - The new controls which have been analyzed include additional stationary source controls, transportation controls, and programs to ensure long-term maintenance of air quality standards.

EPA REQUIREMENTS FOR 1982 SIP REVISIONS

EPA requirements and approval criteria for the 1982 SIP revisions are specified in EPA's final policy "Approval of 1982 Ozone and Carbon Monoxide Plan Revisions for Areas Needing an Attainment Date Extension" (46 FR 7182, January 22, 1981). The basis for this policy is contained in Title 1, Part D of the Clean Air Act Amendments of 1977 (P.L. 95-95). Policy elements are briefly summarized as follows:

Overall, the 1982 SIP is to contain a fully adopted, technically justified program that adopts and commits to implement control measures that will result in the attainment of the O₃ and CO standards no later than 1987, and will provide for reasonable further progress in the interim. The plan must contain three categories of minimum control measures as defined by EPA, and where these are not sufficient to provide for attainment those additional measures which can be implemented by 1987 must be identified and adopted.

The three categories of minimum control measures are reasonably available control technology (RACT) for stationary sources, a vehicle inspection and maintenance program (I/M), and reasonably available transportation control measures (TCMs). The minimum requirement for stationary sources is defined as adopted regulations applying RACT to all sources of volatile organic compounds (VOC) which are covered by a Control Technique Guideline (CTG) document published by EPA, any major

VOC source for which there is no CTG, and all sources of CO emitting more than 1,000 tons per year potential emissions. For I/M, the plan must demonstrate full implementation of the program by December 31, 1982 by providing ten specified elements, e.g., test procedures, emission standards, licensing requirements, etc.

For the TCM portion of the plan, the EPA policy specifies that the following eight elements must be included: 1) an updated emission reduction target for the transportation sector; 2) all reasonably available TCMs from the list contained in Section 108(f) of the Act; 3) commitments, schedules of key milestones and, where appropriate, evidence of legal authority; 4) comprehensive public transportation measures to meet basic transportation needs; 5) a description of the public participation and elected official consultation activities during development of the transportation measures; 6) a monitoring plan to assess the success or failure of the TCMs in achieving the estimated emission reductions; 7) administrative and technical procedures for implementing the conformity provisions of the Act (Section 176 (c)); and 8) a contingency plan that includes a list of projects and planned TCMs which may adversely affect air quality that will be delayed, and a description of the process that will be utilized to initiate the contingency plan.

The plan must demonstrate that reasonable further progress will continue to be made and reported throughout the period of nonattainment. The annual emission reductions must at least equal the emission reductions that would be achieved through a linear attainment program and must distinguish between those reductions projected to result from mobile and stationary source measures.

If the minimum controls summarized above are not sufficient to demonstrate attainment and reasonable further progress within the statutory timeframe, then additional measures must be identified, evaluated, and adopted. These may include the following: application of more stringent controls to stationary sources; application of RACT to a greater number of sources (ie. smaller sources); implementation of a broader range of TCMs; and increasing the coverage and stringency of I/M.

The EPA policy specifies certain process and technical requirements for the 1982 SIP revisions. The process requirements include: conducting consultation among local elected officials, with state and federal agencies to guide developments; joint determination of agency responsibilities for plan development; and joint agreement among affected state and local officials on the emission reduction targets included in the plan. The plan must describe and provide evidence of this consultation. Also, the plan must provide an analysis of the air quality, health, welfare, economic, energy, and social impacts of the measures contained within it.

The technical requirements specified in the EPA policy relate to the air quality data base, the emissions inventory, and the modeling analyses utilized for the plan's development. Generally, EPA requires that the most recent, accurate, and technically defensible data be utilized. This includes the most recent three years of air quality data from the monitoring network, including any special purpose monitoring that was conducted; a 1980 base year emissions inventory where possible; and the use of air quality models which are consistent with EPA guidance documents.

REVIEW OF EXISTING CONTROL PROGRAMS

Many control programs for air pollution currently exist. More are scheduled to be implemented in coming years. Before an examination of potential solutions to our present and projected problems can be conducted, a thorough understanding of existing and planned air pollution programs is needed. These programs have been organized primarily according to implementing authority and/or responsibility.

Existing Stationary Source Controls

In the San Francisco Bay Region, the Bay Area Air Quality Management District (BAAQMD) has been empowered to control air pollution from stationary sources. Since its formation in 1955, the District has developed air pollution control programs for many categories of stationary sources. Over the years the rules have expanded and become more stringent as technology has improved and new techniques for controlling emissions have become available. In the late 1970's the rules were recodified into a new format to facilitate understanding of the rules and provide a framework for future additions.

Regulation 2, Rule 2 (New Source Review) and Regulation 8, Rules 1-28 implement the stationary source controls recommended in the 1979 Bay Area Air Quality Plan. District regulations control air pollution directly by limiting the emission rates of specific contaminants; and also indirectly by curtailing open burning, requiring reformulation of certain products containing organic compounds, and by controlling equipment and operating procedures through the permit system. These rules are among the strictest in the United States.

In addition to its body of local regulations, the District has the broader power to abate a public nuisance that causes "...injury, detriment, nuisance or annoyance to any considerable number of persons ... or which causes ... injury or damage to business or property." (California Health and Safety Code, section 41700.)

In their entirety, District regulations are over a hundred pages long as they contain substantial technical and legal detail, definitions, and lists. A summary of these existing stationary source controls follows. Interested persons may contact the BAAQMD Public Information Office for more detail.

Regulation 1 - General Provisions and Definitions - applicable to all other District regulations. Includes sections on exclusions, breakdown procedures, definition of terms, registration, right of access, sampling facilities, record maintenance and many other provisions.

Regulation 2 - Permits - specifies the requirements for Authorities to Construct and Permits to Operate.

Rule 1 - General Requirements - includes procedures for issuance or denial of permits or authorities, exemptions, appeals against decisions of the APCO and District action on applications.

Rule 2 - New Source Review - applies to new or modified sources which emit more than 150 pounds per day of certain pollutants.

Rule 3 - Power Plants - contains special provisions for the review, and standards for the approval of, Authorities to Construct power plants within the District.

Regulation 3 - Fees - establishes fees to be charged for Hearing Board filings, permits, and other District services.

Regulation 4 - Air Pollution Episode Plan - establishes control and advisory procedures for extra emissions reductions during days when high pollutant concentrations have been measured or are expected. Different actions are specified for three defined stages of alert, and are intended to protect health under adverse conditions.

Regulation 5 - Open Burning - generally prohibits open burning, but also allows for exemptions such as cooking and recreational fires. Also allows conditional exemptions for agricultural burning, disposal of hazardous materials, fire training, and range/forest/wildlife management.

Regulation 6 - Particulate Matter and Visible Emissions - limits the quantity of particulate matter in the atmosphere by controlling emissions rates, concentrations, visible emissions and opacity.

Regulation 7 - Odorous Substances - establishes general limitation on emissions of odorous substances, and specific concentration limits on emissions of certain chemical compounds known to be odorous.

Regulation 8 - Organic Compounds - limits organic pollutants, which are the important precursors of ozone, as follows:

Rule 1 - General Provisions - purpose, definition, exemptions.

Rule 2 - Miscellaneous Operations - limits emissions to 300 ppm carbon and 15 pounds per day.

Rule 3 - Architectural Coatings - limit of 250 grams of volatile organic compounds per liter of coating as applied, excluding water.

Rule 4 - General Solvent and Surface Coating Operations - provides limits on container size (1 liter) and sale volumes (210 liters) for non-complying solvents; limits organic emission rates (450 lb/hr and 3000 lb/day) for complying solvents; limits emission rates (3 lb/hr and 15 lb/day) of organic solvent from heated operations.

Rule 5 - Storage of Organic Liquids - limits emissions from storage tanks containing organic liquids with vapor pressure above 1.5 psia. Limits depend on size and type of tank; some are specified in terms of type of seal to be used.

Rule 6 - Terminals and Bulk Plants - limit of 0.65 lb of organic emissions per 1000 gallons loaded. Specifies equipment and operation of tanks, trucks, and loading racks, with exemptions for small sizes.

Rule 7 - Gasoline Dispensing Facilities and Gasoline Delivery Vehicles - requires that delivery vehicles, storage tanks, and dispensing equipment be equipped to attain 90% reduction from uncontrolled emissions.

Rule 8 - Wastewater (Oil-water) Separators - specifies cover, seal, and operating conditions, and requires 90% reduction in emissions.

Rule 9 - Vacuum Producing Systems - requires collection of organic emissions from vacuum producing systems at petroleum refineries.

Rule 10 - Process Vessel Depressurization - requires collection and control of organic compound emissions from depressurizing any process vessel at a refinery during turnaround.

Rule 11 - Metal Container, Closure and Coil Coating - limits of 200 to 660 grams VOC per liter, excluding water, for various coatings. Alternative compliance of 120 gm/l emissions for coil coating.

Rule 12 - Paper, Fabric and Film Coating - limit of 120 gm VOC emissions per liter of coating applied, excluding water.

Rule 13 - Light- and Medium-duty Motor Vehicle Assembly Plants - limits VOC content (145 to 590 grams per liter) for various kinds of paint used; allows alternative equivalent control.

Rule 14 - Surface Coating of Large Appliances and Metal Furniture - limits VOC content of coatings to 275 grams per liter for baked finishes and 340 grams per liter for air-dried finishes; allows equivalent level of control. Requires electrostatic application or 65% transfer efficiency.

Rule 15 - Cutback Asphalts - prohibits use of rapid-cure liquid asphalt; prohibits use of cutback asphalt from April to October; prohibits use of emulsified asphalt with greater than 3% petroleum solvent.

Rule 16 - Solvent Metal Cleaning Operations - requires covered container, drained solvent return, posted operating procedures. Specifies solvent types, vapor pressure limits, equipment requirements, and operating procedures for solvent degreasers.

Rule 17 - Dry Cleaners - requires vapor condensation or 85% reduction or 100 ppm limit on exhaust gases from drying tumblers and cabinets.

Rule 18 - Valves and Flanges at Petroleum Refinery Complexes - limits leak rate from valves and flanges to measurement of 10,000 ppm at one centimeter distance, and sets schedules for required repairs.

Rule 19 - Surface Coating of Miscellaneous Metal Parts and Products - limits VOC content of coatings to 275 gm/liter for baked coatings and 340 gm/liter for air-dried coatings. Requires electrostatic application or 65% transfer efficiency. Allows alternate equivalent controls.

Rule 20 - Graphic Arts Coating Operations - requires low-solvent ink or 85% overall control from publication gravure; 75% from packaging gravure, wall paper screen printing, flexographic printing, detergent packages, etc. Allows alternate equivalent controls.

Rule 21 - Rubber Tire Manufacturing Operations - requires emission collection device and 95% control on cementing and bead dipping devices; water-base coatings or 90% collection and 95% control of emissions from green tire coating; allows alternate equivalent control.

Rule 22 - Valves and Flanges at Chemical Plant Complexes - limits leak rates to measurement of 10,000 ppm (as methane) at 1 cm distance, and sets repair schedules.

Rule 23 - Coating of Flat Wood Paneling - limits emissions to 6 to 12 lb per 1000 square feet of finished products. Requires low-solvent coatings, 90% control by incineration, or equivalent.

Rule 24 - Manufacture of Synthesized Pharmaceutical Products - provides emission limits or control requirements for reactors, crystallizers, centrifuges, rotary vacuum filters, tanks, and dryers used in pharmaceutical manufacture.

Rule 25 - Pumps and Compressor Seals at Petroleum Refineries - limits leak rates to a measurement of 10,000 ppm (as hexane) and sets repair schedules.

Rule 26 - Magnet Wire Coating Operations - requires use of coatings with less than 200 gm/liter VOC or 90% control.

Rule 27 - Perchloroethylene Dry Cleaning Operations - requires carbon adsorber or 90% reduction or 100 ppm limit on exhaust gases from drying tumblers and cabinets.

Rule 28 - Pressure Relief Valves at Petroleum Refineries - requires that relief valves reseal on depressurization, or vent to 90% control device, or be protected by a rupture disk.

Rule 29 - Aerospace Coatings - rule now in development stage.

Regulation 9 - Inorganic Gaseous Pollutants - limits emissions and ground level concentrations of the following:

Rule 1 - Sulfur Dioxide - limits most sources to 300 ppm, with no resulting ground level concentrations above state or federal ambient air quality standards; ships to 2000 ppm or 3.34% sulfur fuel. Other fuel burning limited to 0.5% sulfur or 300 ppm. Separate limits for sulfur recovery plants, sulfuric acid plants, fluid catalytic cracking units, cokers, coke calcining kilns, and catalyst manufacturing plants.

Rule 2 - Hydrogen Sulfide - prohibits emissions which result in ground level concentrations exceeding 0.06 ppm for 3-minute average, or 0.03 ppm for one-hour average.

Rule 3 - Nitrogen Oxides from Heat Transfer Operations - for large sources (1.75 billion BTU/hr), limits NO_x emissions to 175 ppm on gas and 300 ppm on liquid fuel. Limits are 125 and 225 ppm for new or modified 250 million BTU/hr sources.

Rule 4 - Nitrogen Oxide from Fan Type Central Furnaces - limits home furnaces to 40 nanograms per joule useful heat; mobile home furnaces to 50 ng/J.

Rule 5 - Hydrogen Sulfide from Geothermal Power Plants - limits power plants, steam supplies, and wells.

Regulation 10 - New Plant Performance and Emission Requirements - establishes emission and/or performance requirements for the following new and modified sources: steam generators, solid waste incinerators, Portland cement plants, nitric acid plants, sulfuric acid plants, asphalt concrete plants, petroleum refineries, storage vessels for petroleum liquids, secondary lead smelters, secondary brass and bronze ingot production plants, iron and steel plants, sewage treatment plants,

phosphate fertilizer plants, steel plant electric arc furnaces, primary aluminum reduction plants, primary copper/zinc/lead smelters, coal preparation plants, ferroalloy production facilities, kraft mills, grain elevators, electric utility steam generating facilities, gas turbines, glass manufacturing plants, and ammonium sulfate manufacturing.

Regulation 11 - Hazardous Pollutants - sets emission and/or performance standards for hazardous pollutants as follows:

Rule 1 - Lead - Limits lead emissions to 15 pounds per day and prohibits ground level concentrations above 1 microgram per cubic meter, 24-hour average.

Rule 2 - Asbestos - prohibits certain uses of asbestos, visible emissions from mill or product fabrication; also specifies procedures for removal, demolition, and waste disposal of asbestos-containing materials.

Rule 3 - Beryllium - limits emissions to 10 grams per day, or ground level concentrations to 0.01 micrograms per cubic meter, 30-day average.

Rule 4 - Beryllium - Rocket Motor Firing - limits emissions from test sites and combustion product tanks.

Rule 5 - Mercury - limits emissions from ore processing to 2.3 kg per 24-hour period; sludge incineration plants to 3.2 kg per 24 hr.

Rule 6 - Vinyl Chloride - limits emissions from vinyl chloride manufacturing plants.

Regulation 12 - Miscellaneous Standards of Performance - establishes emission and/or performance standards for plants and operations that are not otherwise included in District regulations.

Rule 1 - Kraft Pulp Mills - limits total reduced sulfur emissions to 15 ppm average during operating hours, and to 0.3 lb per ton of pulp produced.

Rule 2 - Rendering Plants - requires incineration or equivalent control of effluent gases.

Rule 3 - Asphalt Air Blowing - requires incineration or equivalent.

Rule 4 - Sandblasting - limits visible emissions, procedures, and abrasive size.

Rule 5 - Phosphate Fertilizer Plants - limits fluoride emissions from certain storage and manufacturing facilities.

Rule 6 - Acid Mist from Sulfuric Acid Plants - limit of 0.3 lb per ton of acid produced.

Motor Vehicle Emission Controls

The California Air Resources Board (CARB) is the State agency responsible for coordinating both State and federal air pollution control programs in California. This responsibility includes regulation of pollutant emissions from motor vehicles and coordination of local programs for stationary source control.

Due to the severity of air pollution problems in California, the federal government gives the State the option of enforcing motor vehicle emission standards which are more stringent than federal emission standards. Thus, while the Environmental Protection Agency takes primary responsibility for motor vehicle emissions control, the CARB can and has adopted and enforced emission standards more stringent than required at the federal level. This section summarizes CARB responsibilities for mobile source control.

The CARB currently has regulations which control emissions from light-, medium- and heavy-duty gasoline powered vehicles, diesel powered trucks and buses, and motorcycles. In addition, the CARB has in effect various regulations and procedures to ensure that emission standards are met. Appendix K presents current vehicle emission standards adopted by the CARB.

In the 1979 Bay Area Quality Plan, two actions were proposed to reduce motor vehicle hydrocarbon and carbon monoxide emissions. These actions were as follows:

- o Implement more stringent vehicle emission standards - this measure was included in the plan to ensure long-term maintenance of the ozone and carbon monoxide standards;
- o Implement an inspection/maintenance program for light- and heavy-duty vehicles statewide - this measure was included in the plan for attainment of the ozone and carbon monoxide standards by 1985-87.

The following paragraphs describe the current implementation status of these actions.

More Stringent Vehicle Emission Standards. The Air Resources Board amended the State Implementation Plan to include commitments for study by the State of nine control measures affecting mobile sources. Included among the nine control measures to be examined further by the ARB is one referred to as "Electric-Powered Vehicles and Stricter Emission Standards for Light-Duty Vehicles." In the revised Chapter 4 of the State Implementation Plan, the ARB indicated this measure is intended to emphasize the consideration of incentive measures designed to promote the development and production of electric-powered vehicles which could be utilized in urban areas. The Board acknowledged the rapid changes being made in vehicle emission control technology, and directed the staff to continue optimization of light-duty vehicle emission controls, including consideration of stricter emission standards.

Inspection/Maintenance. A motor vehicle inspection and maintenance (I/M) program is a vital link in the overall strategy for control of vehicle emissions, and such a program was adopted in the 1979 Plan. The California Legislature has considered proposals for an automobile inspection and maintenance program for more than a decade. As a result of the 1977 Amendments to the Clean Air Act, efforts to authorize such a program have increased. To date, however, the Legislature has not authorized such a program.

Since the California Legislature has thus far been unable to adopt the necessary authorizing legislation for I/M, this program will be proposed once more for the 1982 Plan. The most recent version of I/M legislation is SB 33 (Presley), which has been passed by the Senate and is currently awaiting action in the Assembly. Cost and effectiveness estimates for I/M vary widely depending upon the assumptions made about how it will ultimately be designed, implemented, and enforced. The most recent data from EPA indicate that a 35 percent reduction in hydrocarbons and a 32 percent reduction in carbon monoxide emissions from automobiles are reasonable estimates of the effectiveness of an I/M program within the provisions of SB 33. This translates to emission reductions of approximately 41 tons of hydrocarbons and 480 tons of carbon monoxide in the Bay Area.

Aside from I/M for light- and medium-duty vehicles, ARB is developing antitampering regulations for on-highway heavy-duty vehicle engines. This program will become important in later years when the emission standards for new heavy-duty vehicles take full effect. Preliminary estimates indicate that by 1987 an emission reduction of roughly 0.2 tons/day of hydrocarbons and 16 tons/day of carbon monoxide may be achieved by this measure.

Transportation Control Programs

The Bay Area has a long history of efforts to encourage alternative modes of transportation and thus reduce dependence on the automobile. The Regional Transportation Plan states that "Priority shall be given to projects or programs that reduce dependence on automobile travel and conserve energy, including projects that enhance or complement pedestrian, bicycle, car/van pool, and transit travel." The following is a summary of some of these efforts:

Transit Service

- o The BART system was built almost entirely with local funds.
- o The established transit systems in the Bay Area (AC Transit, S.F. MUNI, and the Southern Pacific) have been improved and expanded in the last decade. In addition, a number of new systems (Golden Gate Transit, Santa Clara Transit, SamTrans, and Central Contra Costa Transit) have begun service. The percentage of commuters travelling on transit in the San Francisco/Oakland metropolitan area rose from 14.97% in 1970 to 17.47% in 1980. Over this same period transit ridership was declining in most other areas of the U.S.

- o Nearly \$580 million is spent annually in support of transit in the Bay Area.
- o The region has continually sought additional funds for transit. Alameda, Contra Costa, San Francisco, San Mateo, and Santa Clara counties all levy an additional 1/2-cent sales tax to support transit operations. MTC raised bridge tolls in 1977 to generate an additional \$8 million/year for transit capital. Golden Gate Transit is subsidized by tolls from the Golden Gate Bridge.

Ridesharing

- o RIDES, a non-profit corporation funded by MTC and Caltrans, provides carpool matching services in the Bay Area and also facilitates vanpool formation.
- o Carpools are allowed free passage on the major bridges crossing the Bay during commute hours.
- o High-Occupancy Vehicle lanes are provided on I-280 in San Francisco, I-580 through the Dublin Canyon, the approach to the Bay Bridge, and Rte. 101 in Marin County. San Francisco has exclusive bus lanes on a number of its city streets.
- o Caltrans provides free parking for vanpools in downtown San Francisco. Caltrans also opened 50 fringe parking lots for use by bus and carpool patrons in the region.

Bicycle Programs

- o 2% of Transportation Development Act funds in this region are earmarked for bicycle and pedestrian projects. In the 1981-82 fiscal year, these funds totalled over \$1.6 million.
- o Bike lockers are provided at many BART and Southern Pacific stations. Bicycles can be carried on BART during non-commute hours.
- o Palo Alto enacted a bicycle parking ordinance that requires bicycle parking facilities at new developments.

Employer-Based Programs

- o MTC, through its Commute Alternatives Program, conducts training sessions for transportation coordinators. These coordinators are designated by their employers and assist other employees in finding alternative modes for commuting. MTC has produced a training manual and has held 3 training sessions thus far.
- o A flextime demonstration program was conducted with major employers in San Francisco in an attempt to reduce congestion by spreading the commute times.

Auto Restraints

- o The Bay Area was one of the first metropolitan areas in the nation to reassess its freeway construction program. Some projects, such as the Southern crossing, were stopped upon voter insistence.
- o The City of Berkeley installed a system of traffic diverters to keep through-traffic out of residential neighborhoods. However, a recent ruling by the California Supreme Court may end this program.

It is evident that much has been done in the Bay Area to encourage alternatives to the automobile. In the 1979 Air Quality Plan, five specific transportation measures were adopted by MTC. These measures are reaffirmed in the current plan. The following summarizes the progress to date and the proposed efforts for these measures:

1. Transit Service Increase

Ridership on the six major transit systems in FY 1980-81 totalled 319.1 million, which is 26.1% above the 253 million riders in FY 1977-78. This is above the targeted increase of 16.8% (3 years progress toward the 5-year, 28% goal).

The transit operators have updated their 5-year plans and adopted budgets for FY 1981-82. Cuts in federal subsidies make it quite difficult to expand the systems, and fares are being increased on most systems this year. The operators anticipate that additional transit growth in the near future can be accommodated through productivity improvements. This measure is reaffirmed in the current plan as TCM #1.

2. Bicycle Facilities

A draft regional bicycle plan has been prepared by MTC. This plan contains policies to direct MTC's administration of Transportation Development Act funds which are earmarked for bicycle/pedestrian projects. In addition, a number of actions which MTC can take to encourage bicycle use are identified. This plan will be incorporated into the RTP in September of 1982.

The effectiveness of this measure has been re-estimated in the current air quality plan. It is now anticipated that the bicycle system will reduce HC by 0.4 tons/day in 1987, CO by 5.4 tons/day, NO_x by .1 tons/day. See TCM #11 for further details.

3. Encourage Ride Sharing

RIDES, a non-profit corporation funded by Caltrans and MTC, is the primary agency for ridesharing services in the Bay Area. RIDES provides carpool matching services and also facilitates vanpooling. RIDES had 272 vans in operation as of June, 1981. From surveys conducted by RIDES, it is estimated that the carpool and vanpool efforts over the last year reduced HC by 0.36 tons/day, and CO by 4.06 tons/day. This is consistent with the schedule assumed in the 1979 plan.

Funding will continue for RIDES and other ridesharing agencies in the next fiscal year. RIDES intends to concentrate on outreach services to employers in an attempt to expand their market. TCM #5 in the current plan reaffirms this measure.

4. Preferential Parking for HOVs

Caltrans is the primary agency working on this measure. Caltrans has opened approximately 50 fringe parking lots in the region to facilitate bus, carpool, and vanpool usage. Caltrans also administers 11 privately-owned park-and-ride lots. Free vanpool parking in downtown San Francisco is also provided through another Caltrans program. At present, approximately 200 vans make use of this program.

Although it was not possible to quantify the emissions reductions from this program, the level of effort suggests that the total program will achieve the 1985 targeted emissions reductions of 0.1 tons/day of HC and 1.5 tons/day of CO. This measure is reaffirmed in the current plan as TCM #7.

5. Provide HOV Lanes/Ramp Metering

A number of HOV projects have been implemented in the Bay Area. Included are HOV lanes on I-580 through the Dublin Canyon, Rte. 101 in Marin County, I-280 in San Francisco, and the Bay Bridge Approach. Ramp metering with HOV bypasses are provided on I-280, Rte. 17, and Rte. 101 in Santa Clara County. A new HOV lane from Grand Avenue to the Bay Bridge has just been opened in the last year.

Again, it is difficult to estimate the effects of this program because of the problem of isolating the effects of the HOV facilities from other ridesharing and transit incentives. It is expected, however, that these efforts will achieve the 1985 emissions reductions target of 0.2 tons/day of HC and 1.5 tons/day of CO. This measure is reaffirmed in the current plan as TCM #4.

SECTION III

PRESENT AND PROJECTED EMISSIONS, AIR QUALITY, AND EMISSION REDUCTION TARGETS

PRESENT AIR QUALITY

The Bay Area Air Quality Management District maintains and operates an extensive air quality monitoring network throughout the region. Data are collected regularly for pollutants which have air quality standards established. The five pollutants for which federal standards have been established are sulfur dioxide (SO_2), total suspended particulate (TSP), carbon monoxide (CO), nitrogen dioxide (NO_2) and ozone (O_3). Brief summaries of air quality levels experienced in the Bay region are given below. More detailed discussions may be found in Tech. Memos 32 (Sandberg, et al., 1980) and 37 (Sandberg, et al., 1981).

Sulfur Dioxide -- In 1979 there were no excesses of State or federal sulfur dioxide standard, and all 20 community monitoring stations showed decreases from long-term and 1978 annual averages. The decrease was sharpest at the industrial community stations of Contra Costa County, all of which were at least 85% below the federal annual (.03 ppm) standard.

Total Suspended Particulates -- The annual geometric means of total suspended particulate continued to show a pattern of low values near the coast increasing with distance inland, particularly in dry, sheltered valleys. Isopleths of TSP increase from a 35 ug/m^3 background value parallel to the coast to near 60 ug/m^3 at the most inland valley sites. Urban centers such as San Francisco and Richmond appear to add 5-8 ug/m^3 to the maritime background levels.

Nitrogen Dioxide -- The federal standard for nitrogen dioxide is not exceeded in the Bay Area. In addition, in 1979 there were no excesses of the State .25 ppm hourly standard at any station for the first time in 13 years of continuous monitoring. Maximum-hour averages for the NO_2 season show a 10% decrease from 1978.

Carbon Monoxide -- Maps of annual average ambient concentrations are of little value for carbon monoxide, since over 90% of the CO is emitted from vehicular sources, resulting in a complex, latticed pattern corresponding closely to highway networks. These tail-pipe level emissions are also particularly sensitive to low-level radiation inversions, resulting in very strong daily and seasonal cyclic variations.

Despite the large tonnage of CO emissions, the federal and State one-hour CO standards have not been exceeded in the current decade. However, the federal 8-hour average standard of 10 mg/m^3 (9 ppm) has been exceeded frequently in some areas. The major excess area is the Santa Clara Valley, centered on San Jose. There are isolated urban-center cases at other sites.

To explain this peculiar pattern one must examine the seasonal and daily cycles in the data. In the past 10 years there have been no CO excesses from March through August. Over 80% of the excesses occur in November, December, and January. On a daily basis over 90% of these 8-hour excesses occur between 4 p.m. and 2 a.m. There is an intense but short maximum from 7 to 9 a.m., followed by low levels from 10 a.m. to 4 p.m. Then, since the winter-season formation of surface-based radiation inversions corresponds to the evening traffic maximum, the sustained build-up of high CO levels occurs. There is also a day-of-week factor, with greatest frequency of excesses on Friday, the maximum vehicle use day. Typically, the Bay Area's highest CO values are recorded near 11 p.m. on Friday nights in downtown San Jose. Hopefully, this targeting of the excesses in time and space may suggest the most precise and cost-effective control strategies.

The number of 8-hour CO excesses has decreased from 69 days in 1976, 41 days in 1977, and 24 days in 1978 to 21 days in 1979. A secondary maximum over Vallejo has disappeared. However, measured ambient CO levels have decreased less rapidly than total emissions, possibly because the ambient values in this air basin are most sensitive to winter evening driving modes and patterns.

Ozone

In February 1979 the federal standard for "photochemical oxidants" was changed to "ozone", the major component of the oxidant mix and the one primarily measured. To allow for the wide year-to-year variations in ozone observed nationally (as well as locally) the new federal standard is based on a running 3-year average, called the Expected Annual Exceedance, of days with maximum hourly concentrations above 12 pphm. On a site-specific basis, this average is not to exceed one day per year.

The compliance status of District monitoring stations for 1979 with respect to this standard is shown in Figure 3. Of 26 monitoring sites, 14 meet the federal standard, with the exceedances (bounded by the 1-day line on ozone map) centered in the Santa Clara, Livermore, and Diablo Valleys. Exceedance values are zero near the coast and across San Francisco and Oakland, increasing inland, particularly in sheltered valleys. The map is particularly encouraging in terms of population exposure, with some 56% of Bay Area population in attainment areas. In recent years only the Los Gatos area has averaged more than 10 ozone exceedance days per year. By comparison, the maximum number of exceedances in 1969 (more than 40 days) was in the Livermore Valley, within the 10-day exceedance line encompassing all three valleys, as shown in Figure 4.

Figure 5 summarizes 15 years of Bay Area ozone data for various levels of occurrence, including the current .12 ppm (12 pphm) standard and the .20 ppm (20 pphm) advisory level. Also graphed are ozone season average trend values and inventoried hydrocarbon/oxides of nitrogen ratios. The trend study, based on seasonal high-hour ozone averages for comparable days with high temperatures and low inversions, shows a 40% decrease in the 7-station average over 15 years, for a 2.7% per year

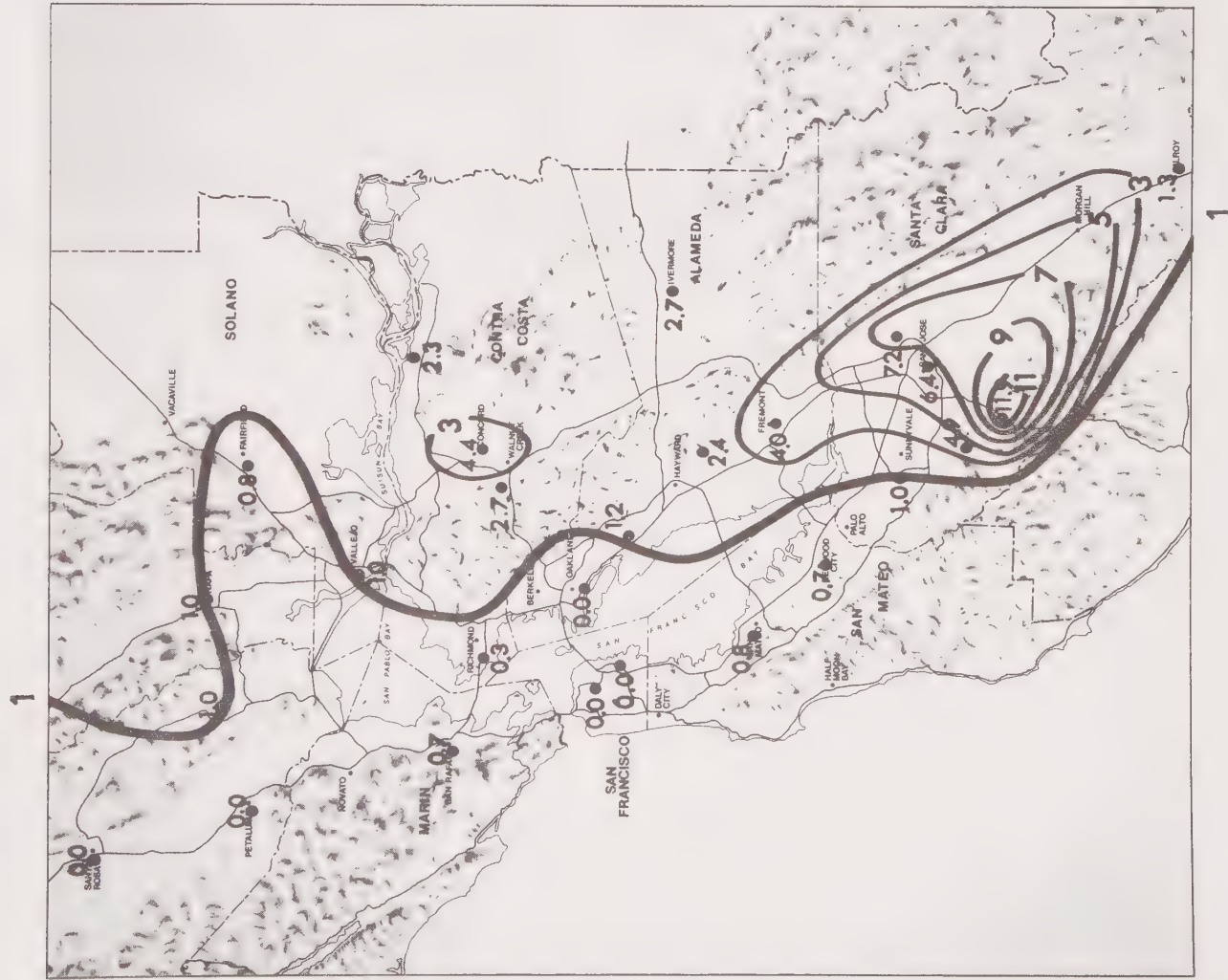


Figure 3. 1979 Expected Annual Exceedances of Federal Ozone Standard in days per year with maximum hourly ozone concentration exceeding .12 ppm, based on 3-year average (1977-1979)

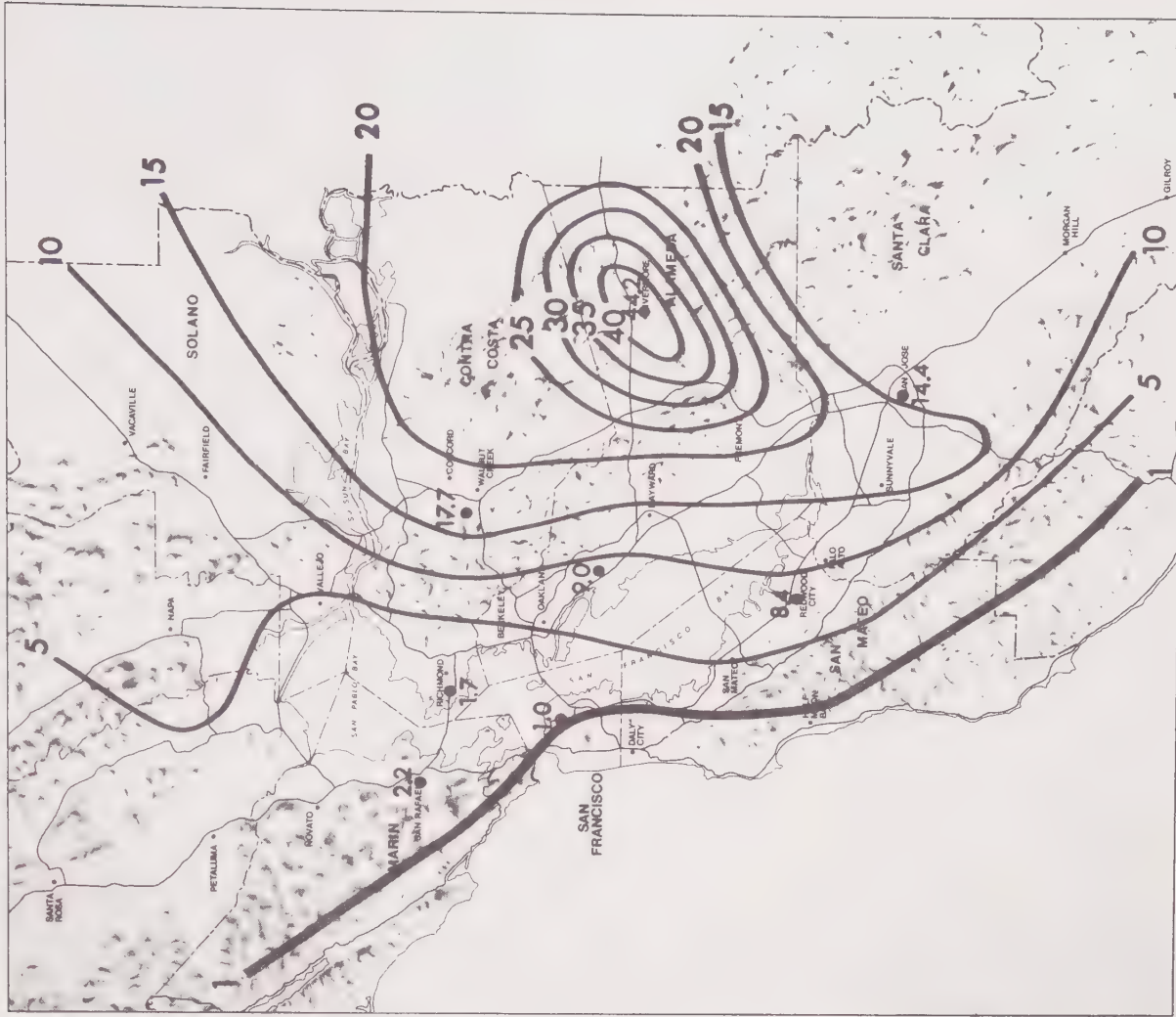


Figure 4. 1969 Expected Annual Exceedances of Federal Ozone Standard in days per year with maximum hourly ozone concentration exceeding .12 ppm, based on 3-year average (1967-1969)

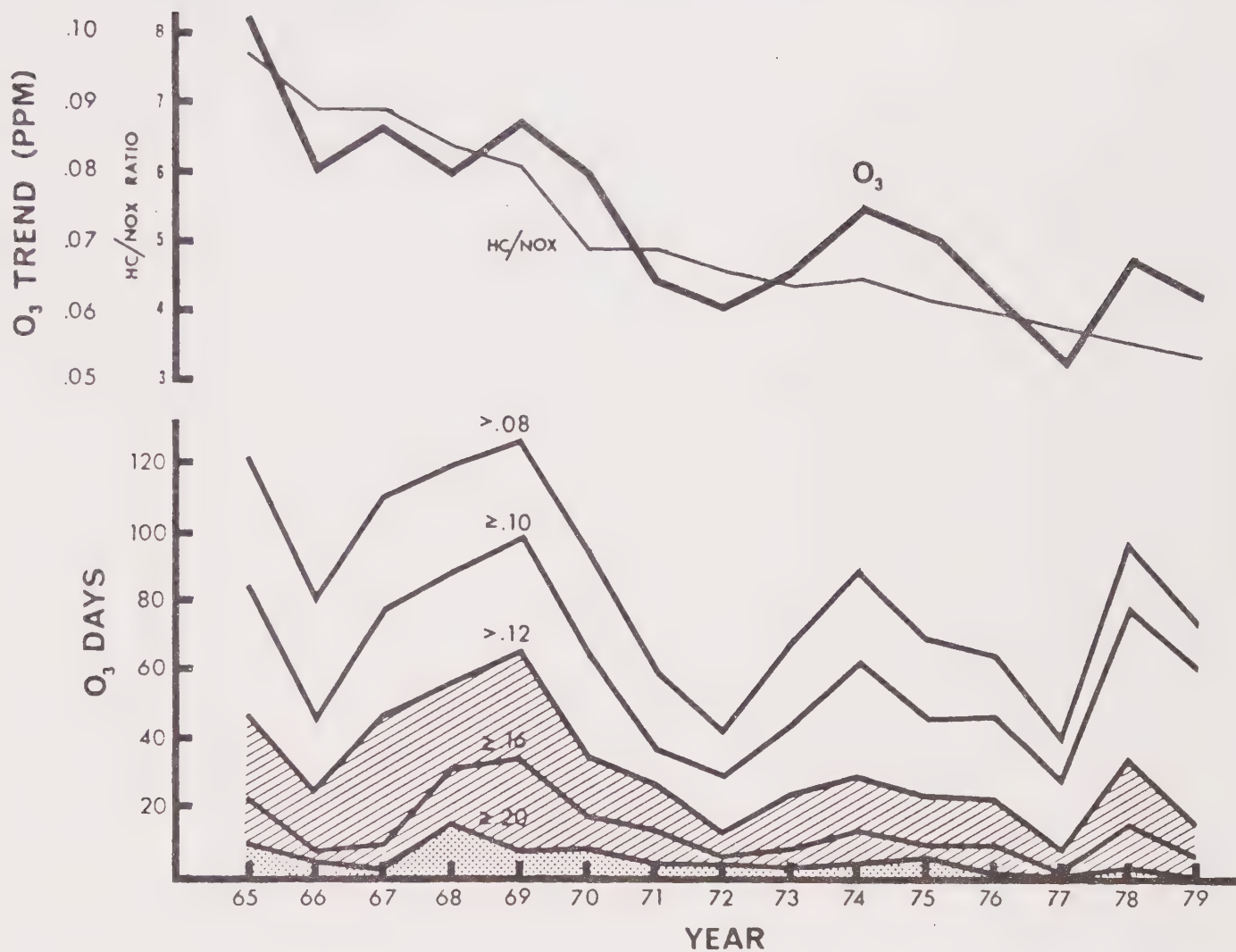


Figure 5. Ozone Trends, 1965-1979

Lower graph lines show annual occurrence of days with any station exceeding various ozone levels: .08, .10, .12, .16 and .20 ppm. The Federal standard of .12 ppm is shaded. In upper graph, the heavy "trend" line shows the mean annual ozone values on comparable days with warm temperatures and low inversions; the thin line shows HC/NO_x ratios from annual emission inventories.

decrease. The closely comparable decrease in hydrocarbon/oxides of nitrogen ratios from emissions inventories over the same period would serve to support current hydrocarbon-directed control strategies. Local differences in the rate of improvement suggest that high growth continues to counterbalance increased control in some sections of the District.

PRESENT AND PROJECTED EMISSIONS

This section presents a summary of present and projected emissions of five major air contaminants for the San Francisco Bay Region. The purpose of the emissions inventory is to identify each significant source of pollutants contributing to the air quality problems of the region. In some cases it is possible to identify a single category of sources as being the major contributor to a given problem (e.g., carbon monoxide from motor vehicles or sulfur dioxide from fuel combustion in electrical generating plants). In other cases, such as ozone, no single category of sources can be identified as the root of the problem. By identifying the most significant sources, the emissions inventory provides direction for efforts to control emissions and therefore minimize the problems they cause. Thus, the inventory is a crucial prerequisite to the development of any plan to improve air quality.

In order to develop a long range plan to improve air quality, it is necessary to know not only what current emission levels are, but what future emission levels will be. Future emissions are derived from present emissions in each category of sources, combined with energy assumptions and estimates of growth rates as described in Tech. Memo 34 (Crouse, et al., 1981) and the expected effects of control programs which are in effect now or adopted and scheduled for implementation. The projected emissions thus reflect normal growth trends.

The Bay Area Air Quality Management District (BAAQMD) prepared a detailed emissions inventory from all sources except motor vehicles and vegetation. The motor vehicle emissions estimates were made through the joint efforts of the Association of Bay Area Governments (ABAG), Metropolitan Transportation Commission (MTC) and California Air Resources Board (ARB). The emissions from vegetation were estimated by the ABAG. Emission inventories for the Bay Area for the years 1975, 1979, 1987 and 2000 are summarized in Appendix E and Table 3. Future year emissions will be influenced by the availability of natural gas and the trade off between newer vehicles with lower emissions and increased vehicle use. Future trends in organics, oxides of nitrogen and carbon monoxide emissions are graphically shown in Figure 6.

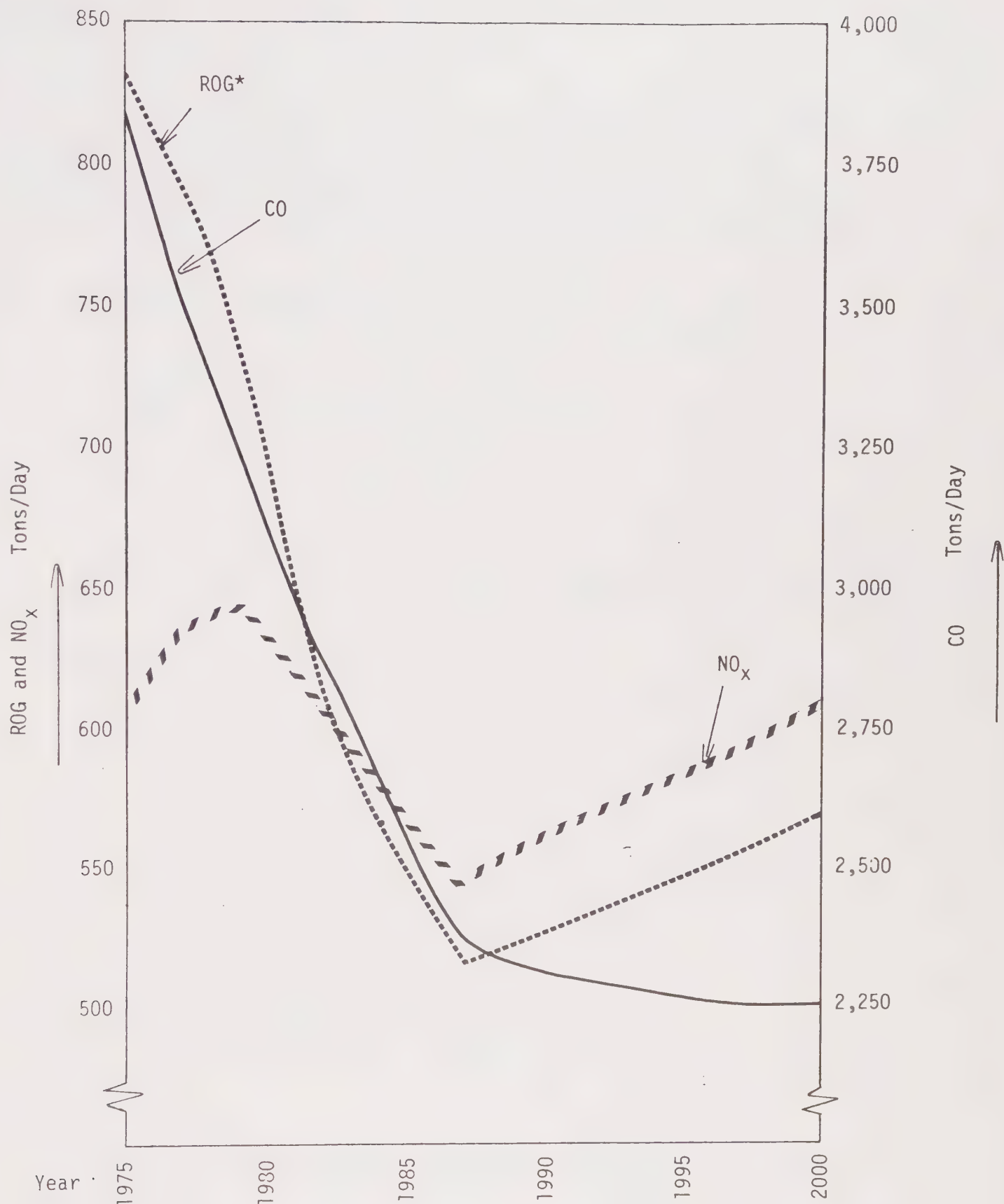
Organic emissions are expected to continue a downward trend due to motor vehicle controls and the implementation of the BAAQMD's Regulation 8 on organic compounds. After 1987 the organic emissions show increases due to normal growth. Oxides of nitrogen emissions are expected to decline due to controls on motor vehicles, and then increase due to normal growth. Carbon monoxide emissions are expected to decline due to existing controls on motor vehicles.

TABLE 3. SAN FRANCISCO BAY AREA EMISSION INVENTORY SUMMARY, 1979-2000

Year		(Emissions (Tons/Day))					Carbon Monoxide (CO)
		Particulate Matter	**Reactive Organics (ROG) or Hydrocarbons (HC)	Nitrogen Oxides (NOx)	Sulfur Dioxide (SO2)		
1979	Stationary	205	359	321	177	264	
	Motor Vehicle	34	310	310	17	2870	
	Other	240	63	12	1	80	
	Total	479	732	643	195	3220*	
1987	Stationary	221	275	344	161	301	
	Motor Vehicle	30	172	186	20	1940	
	Other	285	68	14	1	95	
	Total	536	515	543*	182	2340*	
Percent Change, 1979-1987		+12%	-30%	-16%	-7%	-27%	
2000	Stationary	241	311	407	197	341	
	Motor Vehicle	47	176	182	34	1760	
	Other	361	82	21	2	145	
	Total	649	569	610	233	2250*	

*Totals may differ slightly due to round-off convention employed.

**Does not include Biogenic Hydrocarbon Emissions which have been estimated in Tech. Memo 35 (Hunsaker and Moreland, 1981) to be over 400 tons/day for the nine-county Bay Area.



* Reactive organics are essentially equivalent to non-methane hydrocarbons; these figures do not include biogenic hydrocarbon emissions.

Figure 6. Baseline Emission Inventory Projections, 1975-2000, for Reactive Organics (Hydrocarbons), Oxides of Nitrogen, and Carbon Monoxide.

Stationary Source Emissions

The BAAQMD has refined its 1979 inventory, estimating emissions from 152 source categories, compared to 107 previously used in the 1975 inventory. In addition, detailed emission estimates were prepared for 208 major companies compared to 116 in 1975. The most significant changes between 1979 and 1975 are as follows:

- o Generally, emissions from major companies have shown differences due to the more detailed emissions computations used for 1979.
- o The decrease in sulfur dioxide emissions from chemical manufacturing from 85 tons/day in 1975 to 48 tons/day is attributed to better controls at refineries and acid plants.
- o The decrease in filling station emissions is attributed to vapor recovery controls at the filling stations.
- o The decrease in emissions from solvent storage tanks, degreasers, rubber and plastics manufacturing is attributed to better information available now.
- o Emissions from storage tanks are estimated using new emission factors contained in "Compilation of Air Pollutant Emission Factors" AP-42 by EPA.
- o The addition of the following new categories has increased emissions estimates considerably:
 - Wineries, breweries
 - Pesticides usage
 - Construction operations
 - Demolition operations
 - Oil and gas production fields
 - Lightering, marine vessel transfer
 - Consumer solvent usage (products such as aerosols, toiletries, waxes, polishes, deodorants, etc.)
 - Pleasure boats
 - Paved and unpaved roads (resuspended dust)
 - Ocean/bay salt (from salt water spray)
 - Off-road motor cycles
 - Domestic combustion-oil
 - Resource Recovery projects
 - Cogeneration
 - Gas Distribution (system leakage)
 - Biodegradation (at landfill sites)
 - Photoresist
 - Vegetation

Basic assumptions used in the current projection of the inventory are summarized in Tech. Memos 34 (Crouse, et al., 1981), and 36 (Wada, et al., 1981), and include:

- o Energy use and capacity (natural gas, petroleum, electricity).
- o Population growth as forecast in ABAG's Projections '79.
- o Employment growth and production at various industrial-commercial and manufacturing operations.
- o Control technology.
- o Effects of existing and future control regulations (i.e., BAAQMD Regulation 8, Rules 1-28).
- o Other - including engineering judgement on modifications to all of the above contingencies.

Energy assumptions generally dominate the other assumptions when calculating projections of mass emission rates from stationary sources.

Detailed documentation of the data and assumptions used to prepare the emission estimates for each source category is contained in the "Source Category Methodology" document prepared by BAAQMD (June 1982).

Motor Vehicle Emissions

The inventory of motor vehicle emissions is divided into two parts:

- (i) link emissions - Occurring mainly on major streets and highways, these emissions are from vehicle engines that are fully warmed up (i.e., hot stabilized).
- (ii) trip end emissions - These emissions occur at the beginning and end of each trip due to different engine operating characteristics. There are three types of trip end emissions: cold start, hot start and hot soak.

The methods and data used to compute link and trip end emissions are quite different, as are their resulting geographic and hourly distributions. These methods are fully documented in Tech. Memo 12 (Wada and Kan, 1977) for the 1979 Bay Area Air Quality Plan. For the 1982 Plan, a number of changes in methodology were adopted to reflect more recent developments. These are described in the following sections.

Regional Travel Forecasts -- Table 4 summarizes the current travel forecasts and presents, for comparison purposes, the corresponding outputs from the previous forecasts for the 1979 Plan. A comparison of this baseline with the earlier baseline shows that the current one is slightly lower. This is expected, however, since the current baseline incorporates the improvements in transit service that were adopted in the 1979 Plan.

TABLE 4. COMPARISON OF BASELINE TRAVEL FORECASTS

	Year	Vehicle Trips	VMT
1982 Plan	1979	9,987,800	77,300,000
	1987	11,251,400	90,400,000
1979 Plan	Baseline		
	1975	9,048,800	64,537,900
	1985	10,758,400	80,490,700
	2000	12,898,800	108,999,400
	Control Alt.		
	1985	10,482,800	78,456,100

Emission Factors. In the 1979 Plan the emission factors were based on ARB's EMFAC 3a, modified to account for EPA's Draft Supplement 8 to AP-42. For the 1982 update, the factors were based on EMFAC 6c (ARB, 1980 and 1981), and provided by ARB as before. To illustrate the difference in emission factors, Tables 5 and 6 are comparisons of the link and trip end factors, respectively, for both plans for the year 1975. EMFAC 6c reflects EPA's revised methodology for computing speed and temperature correction factors (USEPA, 1978). Emission factors are derived on the basis of the 1975 Federal Test Procedure, which assumes an ambient temperature of 75°F and an average route speed of 19.6 miles per hour. EMFAC 6c also reflects ARB estimates of vehicle use, age distribution, and vehicle deterioration rates. Speed and temperature correction factors are required in the inventory process to reflect local conditions as much as possible.

Separate trip end emissions inventories were developed for the ozone and carbon monoxide control strategy analyses to reflect the difference in temperature profile between a day in the worst ozone season and a day in the worst CO season. The emissions inventory for ozone was for a September weekday, while the inventory for carbon monoxide was for a November weekday, when ambient temperatures would be lower.

Vehicle Mix. The vehicle mix used in the 1979 Plan is compared in Table 7 with the current mix assumptions for the 1982 Plan. The 1979 Plan was based on statewide average vehicle travel as estimated in 1975, whereas the current mix assumptions are based on actual Bay Area truck counts conducted by Caltrans for MTC (Knudson, 1981). These counts revealed that the percentage of trucks actually on the road in the Bay Area is significantly lower than was assumed for the 1979 Plan.

A further refinement of the vehicle mix was the separate accounting for medium-duty trucks. For the 1979 Plan, medium-duty truck emission factors and estimates of the medium-duty truck population were not complete, so these vehicles were lumped with heavy-duty gasoline trucks. Since emission factors for medium-duty trucks can be significantly lower than those for heavy-duty trucks (see Table 8), the refined category definition had the effect of reducing the contribution of this category to the total link emissions inventory.

Link Speeds. Carbon monoxide and hydrocarbon emissions decrease with increasing vehicle speed; nitrogen oxide emissions increase with vehicle speed. The method for computing link emissions takes this into account by using specified link speeds provided by the MTC travel model, which also produces link trip data. Link speeds can be obtained by a variety of methods. The MTC travel model provides estimates of average link speed and congested link speed. The computer program which is used to estimate link emissions (BAPOLLUT) can also provide estimates of link speed based on volume-to-capacity ratios. In the 1979 Plan the volume-to-capacity ratio method was used. For the 1982 Plan, speeds assigned in the MTC travel simulations were used because it was thought that the v/c ratio method might result in some links being assigned artificially low speeds. This would occur particularly during the peak hours of travel.

TABLE 5. 1975 HOT STABILIZED HIGHWAY LINK EMISSION FACTOR COMPARISON

(grams/mile @20 mph, averaged over all vehicle types)

	CO	HC (Org.)	NO _x	SO _x	PART
1979 Plan	42.30	4.51	3.52	0.17	0.52
1982 Plan	43.5	4.35	2.43	0.12	0.46

Emissions From Natural Vegetation (Biogenic)

In 1980 ABAG initiated a project with partial support from the National Aeronautics and Space Administration (NASA) to prepare an inventory of hydrocarbon emissions from natural vegetation (biogenic).

The biogenic hydrocarbon emissions inventory was prepared from two major data bases:

- o a map of vegetation distribution in the Bay Area compiled from satellite data gathered by NASA;
- o a set of emission factors describing biogenic hydrocarbon emission rates for all of the land cover (vegetation) classes identified in the Region from the NASA data.

**TABLE 6. 1975 LIGHT-DUTY VEHICLE TRIP END EMISSION
FACTOR COMPARISONS (grams per trip)**

<u>Cold Start</u>	<u>CO</u>	<u>HC (org.)</u>	<u>NOx</u>
1979 Plan	178.1	7.37	0.31
1982 Plan	158.0	12.19	3.48
<u>Hot Start (catalyst only)</u>			
1979 Plan	9.35	1.00	1.20
1982 Plan	13.52	3.72	4.50
<u>Hot Soak</u>			
1979 Plan	--	24.30	--
1982 Plan	--	11.18	--

**TABLE 7. COMPARISON OF PERCENT CONTRIBUTION TO REGIONAL
VEHICLE MILES OF TRAVEL BY VEHICLE CATEGORY**

<u>Vehicle Category</u>	<u>1979 Plan</u>	<u>1982 Plan</u>
Light-duty auto	76.4%	81.8%
Medium-duty gasoline truck	--	1.4
Heavy-duty gasoline truck	7.6	1.1
Heavy-duty diesel	3.7	2.9
Light-duty truck and motorcycle	12.3	12.8

TABLE 8. 1979 TRUCK EMISSION FACTORS* (grams/mile)

	<u>CO</u>	<u>HC</u>	<u>NOx</u>	<u>SOx</u>	<u>PART.</u>
Heavy-Duty Gasoline	248.42	12.34	9.50	.36	1.24
Medium-Duty Gasoline	47.93	4.17	3.69	.13	.46

*100% hot stabilized emissions at 20 mph.

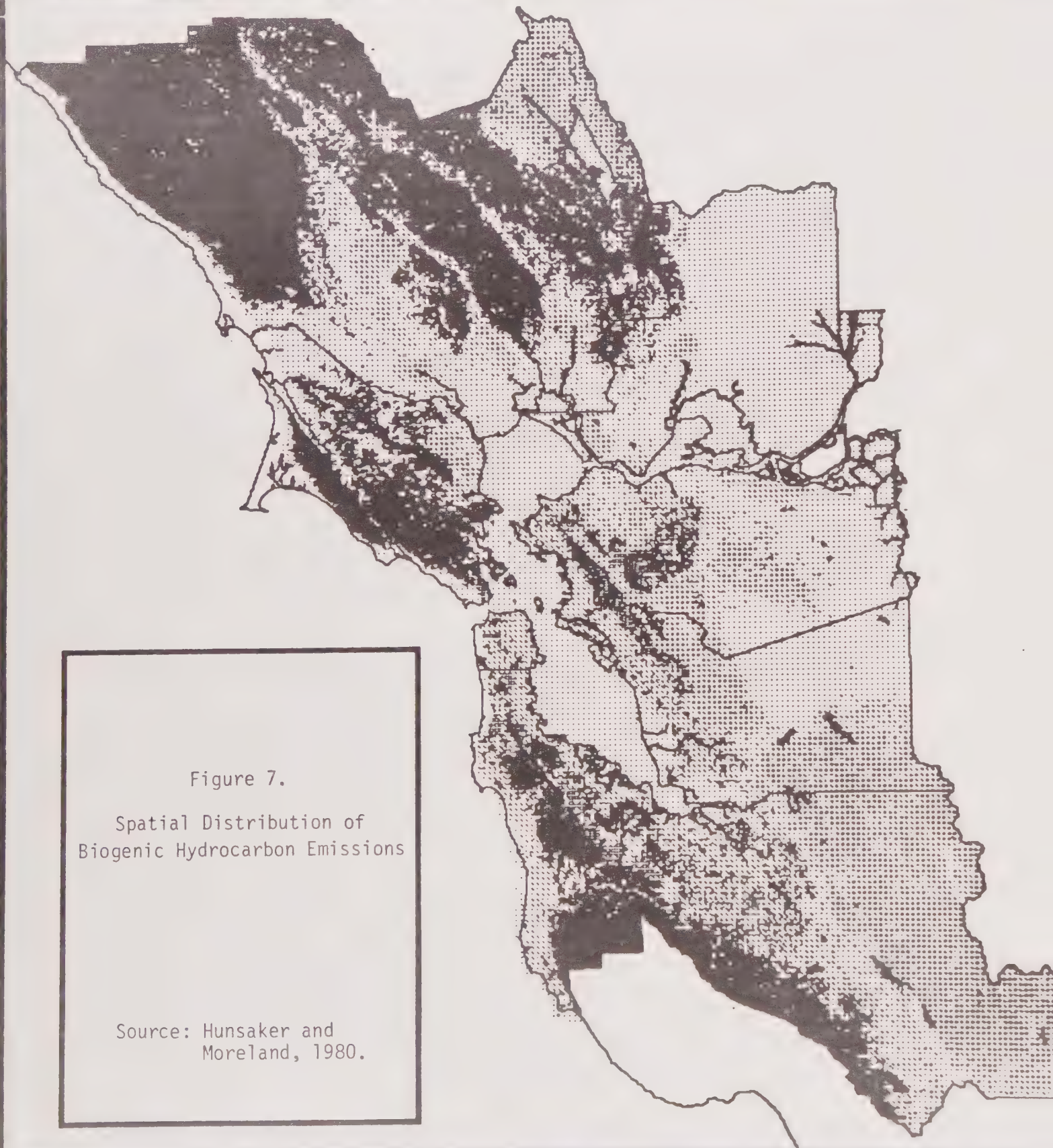
Vegetation File. The vegetation file was derived from satellite imagery of California recorded on August 6, 1976. In order to use these data to produce a biogenic hydrocarbon emissions inventory for the Bay Area, ABAG had to first focus in on the Bay Area portion of that data file, and then identify vegetation classes from the data. Land cover classes in both urban and rural areas were identified and a vegetation file of twenty-three land cover classes was produced. The data file was then converted into a UTM hectare grid and entered into BASIS, ABAG's Bay Area Spatial Information System. Finally, the land cover distribution data were verified by comparison with aerial photography data and by on-site field work analyses of land uses of randomly selected test plots.

Emission Factors. Biogenic hydrocarbon emission factors, expressed as ug emission/m² ground area-hr, were obtained for each of the twenty-three land cover classes by conducting a Delphi survey of scientists familiar with biogenic hydrocarbon emissions. The product of this survey was a set of total non-methane hydrocarbon (TNMHC) emission rates representative of daytime, summertime conditions. The emission rates varied with location in the Region, because the density of the vegetation population varies with location in the Region. Because biogenic hydrocarbon emission rates have been found to be different under day and night conditions, a set of nighttime emission factors, also varying with location in the Region, were developed from the Delphi results. All of these data are summarized in Tech. Memo 31 (Hunsaker, 1981).

Emission Intensity Map. Before the biogenic hydrocarbon emissions inventory was compiled, the vegetation file and emission factors were used to prepare Figure 7, which is a regional map of biogenic hydrocarbon emission intensities per unit area. The area-based daytime TNMHC biogenic emission factors assigned to the land cover classes were grouped into eight categories, each category representing one of the eight shade codes available on ABAG's computer program. Each category was assigned a shade code representative of emission intensity. The darkest shade was used for the highest emission rate per unit area, and the lightest shade was used for the lowest emission rate per unit area.

The map is useful in illustrating the geographical variation of relative biogenic hydrocarbon emission rates per unit area in the Region. For example, one point of interest is the large dark area in northern Sonoma County, where the land cover is primarily oak and coniferous forests. This particular section of the Region is expected to emit larger amounts of biogenic hydrocarbons than the lighter areas, such as the urbanized sections around the Bay. This map is useful in formulating a qualitative picture of biogenic hydrocarbon emission rates and in trying to understand their role in regional ozone production.

Results. Total nonmethane hydrocarbon biogenic emissions in the nine-county Bay Area for a twenty-four hour period of 12 hours of darkness and 12 hours of light were calculated to be 493 tons/day.



As shown in Figure 2, the air quality planning boundary of the BAAQMD defines a smaller region than the nine-county Bay Area. Therefore, the anthropogenic hydrocarbon inventory reported by the Bay Area Air Quality Management District represents a geographical region that is smaller than the nine-county Bay Area. The magnitude of the biogenic inventory cannot be compared directly with that of the anthropogenic inventory since the two inventories do not represent the same geographical area.

The uncertainty in the nine-county biogenic hydrocarbon emissions inventory has been calculated to be ± 50 percent. This uncertainty is based on the uncertainties in the area-based emission factors. The vegetation file also contributed to the total uncertainty of the inventory. The value is unknown because the uncertainty in the file could not be translated into uncertainties in emission rates in a straightforward manner.

Emission Inventories Developed for the Livermore Regional Air Quality Model (LIRAQ)

Except for the biogenic emissions, the previously described emission inventory data represent annual averages of anthropogenic emissions. The LIRAQ simulations of air quality described in subsequent sections used inventories that were adjusted for seasonal and daily time variations, spatial variations, and photochemical reactivity of the emitted species. These adjustments are necessary to ensure that the conditions occurring on the prototype days are simulated as closely as possible.

In 1979 the BAAQMD annual average inventory of reactive organic emissions was 732 tons/day, not including biogenic emissions. If biogenic emissions are included, the total becomes 1225 tons/day. For comparison, the LIRAQ-adjusted total of hydrocarbon species was 1393 tons/day. These adjustments can be significant for specific source categories which produce emissions at higher reactivity or at higher rates during the late summer/early autumn ozone season. The cost-effectiveness estimate of control measures was based on the time- and reactivity-weighted emissions which were used in LIRAQ modeling.

1979 AND 1987 BASELINE OZONE SIMULATIONS

The Livermore Regional Air Quality Model (LIRAQ)

Complex atmospheric and chemical relationships combine to determine air quality on an urban and regional basis. The use of sophisticated planning and analysis tools is necessary for developing information to guide in making decisions that will affect this air quality. The Livermore Regional Air Quality (LIRAQ) model, has been developed as an operational computer code to assist in tasks such as assessing the compliance of present air quality with Federal ambient air quality standards, evaluating the impact on regional air quality of various land use alternatives, and predicting the effect on regional air quality of new sources and various control strategies.

LIRAQ is a gridded, single-layer photochemical model that simulates in space and time changing concentrations of reactive and nonreactive pollutants. The model treats the Bay Area's complex topography and uses time-dependent fields of wind velocity, mixing depth and atmospheric transmissivity from specific days in the past. It also uses time-varying, gridded source emissions, including hydrocarbons specified in four reactivity categories. The model does not attempt to forecast tomorrow's air quality, because that would require the capability to forecast the regional meteorology, a formidable problem in itself. Instead, in LIRAQ, the meteorology must be specified, either at measurement stations or by coordinates. Typically, this involves use of meteorological situations that may be expected to be similar to future weather patterns, (based on sets of previously acquired meteorological observations).

The LIRAQ model is particularly useful for evaluating control strategies because it treats regional fields of pollutant concentrations for prescribed source emissions and meteorology. For example, it can be used to determine the relative role played by various types of sources--mobile, point, airport, and area--in degrading regional air quality. Or, it might be used to investigate the relative importance of various species, as for example the importance of hydrocarbons with different reactivities. With such information, control strategies could be proposed and their effect simulated in order to determine the sense and magnitude of the effect.

Several major changes have been made in the formulation and inputs to LIRAQ since the modeling for the 1979 Plan. Each change has the potential to produce improvements in the model's performance:

- a) The LIRAQ model chemistry was updated. The latest version, designated LIRAQ-4HC, treats aromatics separately as a new, fourth hydrocarbon class. In addition, inorganic rate constants have been adjusted to conform to the most recent information available. Also, PAN and HNO_4 are now calculated explicitly and HNO_3 , SO_2 and SO_4 have been dropped as reactive species.

- b) Biogenic hydrocarbon emissions have been included in the gridded emissions inventory. The biogenic inventory was developed by using NASA satellite data to identify and classify vegetation types for 1 km x 1 km grid cells in the Bay Area. Emission factors were determined for each vegetation category, and from these the biogenic inventory was generated. Although the total regionwide biogenic hydrocarbon emissions are substantial, over 400 tons per day, they occur predominantly in areas well removed from the urban areas where most of the anthropogenic ozone precursors are emitted. Consequently, the impact of the biogenic inventory is far smaller than the 400 tons/day figure suggests.
- c) A completely new emissions inventory has been developed for the 1979 base year. The new inventory reflects actual changes that have taken place since 1975, the base year used in the 1979 Bay Area Plan. The new inventory also reflects improvements that have been made in estimation methodology, more accurate emission factors, and the addition of several new categories that were not included in the previous base-year inventory.
- d) The meteorological prototypical days were chosen to be representative of adverse conditions in the South Bay/Santa Clara Valley region where the Bay Area's worst ozone problems now occur. For the 1979 Plan, meteorology representing adverse conditions in the Livermore Valley was used because during the late 1960's and early 1970's the Livermore area experienced the Bay Area's highest ozone levels. During recent years Livermore has experienced better air quality than the San Jose area (see Table 9 and the discussion of baseline air quality below).
- e) Modifications were made in specifying some initial and boundary conditions. Initial and boundary conditions are often difficult to specify because of sparse or unrepresentative measurements. Because it was found that the hydrocarbon analyzers used by the BAAQMD typically "see" only about 55% of ambient NMHC, all measured 4:00 a.m. NMHC values were multiplied by 1.8 to give a more accurate estimate of the initial concentration field. Additional adjustments were made to NO₂ and NO measurements to correct for the fact that NO₂ data were about 14% high and NO measurements were on the order of 25% too low.

1979 Baseline Air Quality

The U.S. EPA Guidelines for Interpretation of Ozone Air Quality Standards define two statistical measures of air quality that determine the attainment status of air monitoring sites. The first, the "expected number of annual exceedances," is an estimate of the number of days per year on which the Federal 0.12 pphm standard is likely to be exceeded. The second, the "design value," is defined as that ozone concentration which is expected to be exceeded once per year at a given site. EPA specifies that both air quality measures should be based on the last three years of ozone data in order to reduce the effects of year-to-year meteorological variability.

The expected annual exceedances determine whether or not sites meet the Federal standard. A site is considered to have nonattainment status if its number of expected annual exceedances is greater than 1.0. Table 9 shows that as of 1979, eleven of 21 Bay Area ozone monitoring stations had achieved attainment status.

The design value is a measure of the amount by which the standard is exceeded. Thus, if a site's design value is 15 pphm, we know that worst-case ozone levels must be reduced by 3 pphm (or 20%) before the standard will be attained. Table 9 shows that as of the 1979 base year, Los Gatos had the Bay Area's highest design value of 19 pphm. The LIRAQ modeling in this plan was used to predict the precursor emission reductions needed to reduce the ozone design value from 19 pphm in 1979 to 12 pphm in 1987.

Prototype Day Selection

One of the important inputs to the LIRAQ photochemical model is a description of meteorological conditions for the selected simulation day. The LIRAQ baseline simulation and future year simulations used the same meteorology. The selection of a prototype day having the appropriate meteorology was based on two considerations. First, for State Implementation Plan (SIP) purposes, the demonstration of attainment for 1987 must be based on worst case meteorology. Second, for verification purposes, the prototype day should be compatible with the baseline emission inventory.

In practice, worst case meteorology is defined to be that meteorology associated with the highest observed ozone concentrations. Accordingly, we reviewed historical ozone records to find those days with highest measured ozone concentrations. To account for multi-day stagnation episodes, where pollutants accumulate over time, a two-day modeling sequence was chosen. The advantage of a two day simulation is that the initial conditions for the second day can be taken from the first day's simulation results.

The baseline emission inventory is representative of 1979 emissions, so we restricted the prototype days to those days in late 1978 through 1979. Also, because the emission inventory is representative of weekday emissions, only weekday high ozone days were considered.

Days meeting the above criteria were 28/29 September 1978 and 11/12 September 1979. Both the 29th and 12th have a one-hour maximum concentration of 19 pphm. AQMP Tech Memo. 44 (Duker, 1982) discusses the meteorology on the prototype days.

1979 Baseline Simulation

The 1979 baseline simulation uses a 1979 emissions inventory and the meteorology of September 19, 1978. The two main purposes of this simulation are: 1) to assess model performance by comparing simulated concentrations with observations, and 2) to "calibrate" the model to account for imperfect verification.

Evaluation of the performance of grid-based photochemical models is a complex process; there are no simple rules for judging whether or not a particular simulation is acceptable for use in developing plans for attaining air quality standards. The success of baseline simulation is judged in terms of how closely the model duplicates observed concentrations during the simulation period. Important criteria are that the predicted maximum be reasonably close to the observed maximum and that simulated temporal and spatial variations are similar to observations, particularly in the vicinity of the highest observed values.

Table 10 compares the simulated and observed ozone concentrations at all Bay Area monitoring stations during the 14-hour simulation period. The simulated ozone values approximate the general behavior of observations in the following respects: 1) the observed and simulated maxima were about the same, 2) observed and simulated ozone concentrations were relatively high in the southeastern portion of the modeling region and relatively low in the western and northern portions (see Figure 8), and 3) generally, observed and simulated values increased until mid-afternoon and decreased thereafter.

Model performance for the 9/29/78 prototype day was evaluated using seven performance measures that have been applied to LIRAQ in the past (see AQMP Tech Memo 45 for details). These measures include:

- o the overall root-mean-square difference between all predicted and observed values, which is a measure of the overall agreement between predictions and observations;
- o the overall correlation coefficients, which is a measure of combined spatial and temporal agreement;
- o the ratio of peak values, which measures the model's ability to predict the highest concentrations; and
- o the ratio of ensemble means of all predictions to all observations, which is a measure of overall system bias.

For five of the seven performance measures, the 9/29/78 simulation compares favorably with the simulation of 7/26/73 used in the 1979 Plan. Therefore the 9/29/78 simulation was judged to be acceptable for use the 1982 SIP update.

For the 1979 Plan a single ratio was used to correct for imperfect model performance. The predicted regionwide maximum was multiplied by the ratio of the measured regionwide maximum to the predicted maximum. This technique is easy to apply and relates directly to the worst-case concentrations of interest. However, the use of a single measurement and a simulated concentration at just one place and time is a very narrow measure of the relationship between predictions and observations.

TABLE 9. SUMMARY OF 1979 OZONE COMPLIANCE STATUS OF BAAQMD MONITORING SITES

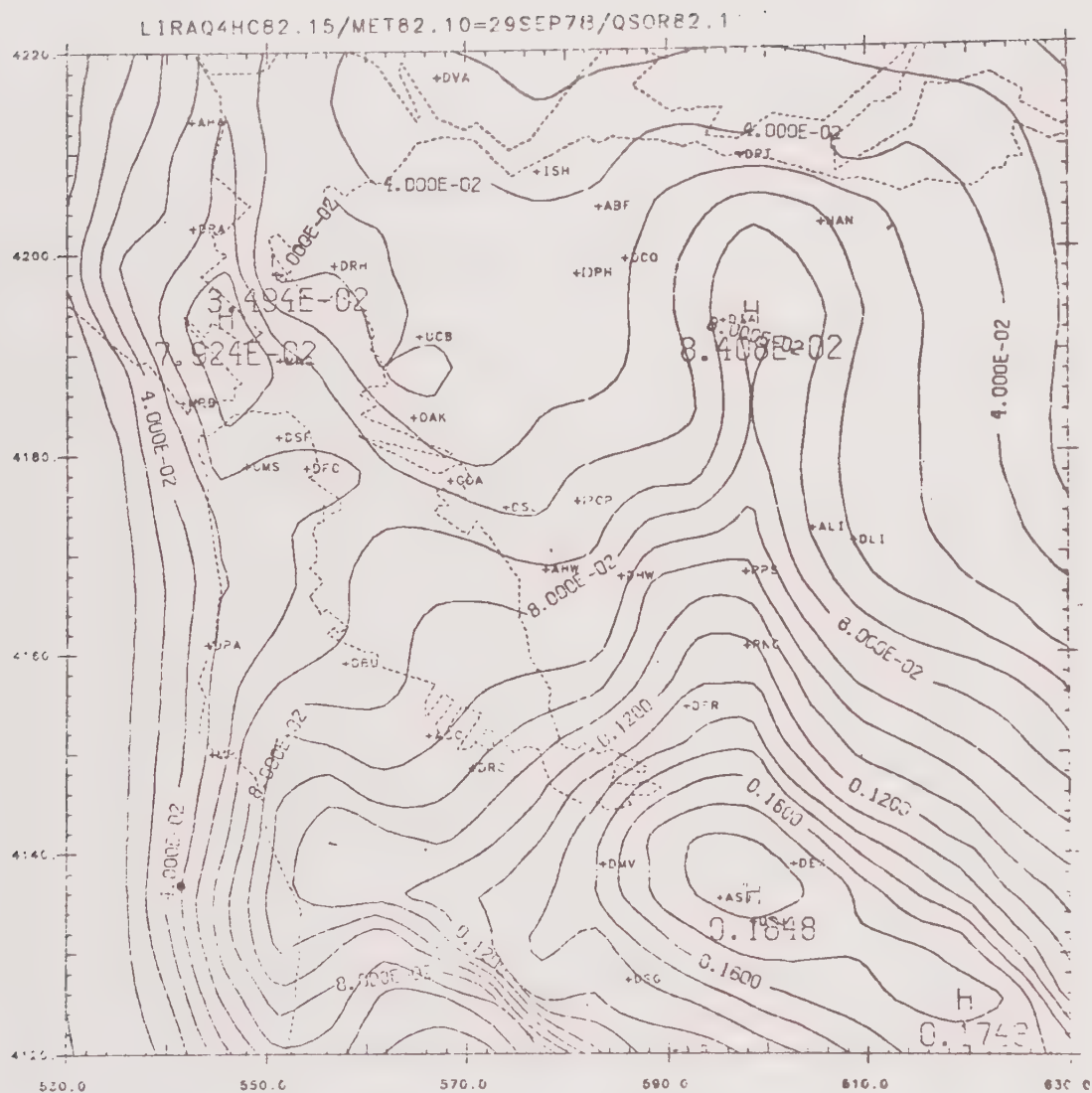
Station	Estimated No. of O ₃ 12 pphm Days			Expected Annual Exceedances* 1977-1979	Design Value** (pphm)
	1977	1978	1979		
Santa Rosa	0.0	0.0	0.0	0.0	....
San Francisco	0.0	0.0	0.0	0.0	....
Oakland	0.0	0.0	0.0	0.0	....
Richmond	0.0	1.0	0.0	0.3	....
San Rafael	0.0	2.0	0.0	0.7	....
Redwood City	1.0	0.0	1.0	0.7	....
Fairfield	1.2	1.1	0.0	0.8	....
Mountain View	1.0	1.0	1.0	1.0	....
Napa	1.0	2.0	0.0	1.0	....
Vallejo	1.0	2.0	0.0	1.0	....
Sonoma	0.0	2.0	1.1	1.0	....
San Leandro	0.0	2.1	1.4	1.2	13
Gilroy	0.0	4.0	0.0	1.3	14
Pittsburg	0.0	6.0	1.0	2.3	15
Hayward	0.0	5.8	1.3	2.4	15
Livermore	3.0	2.1	3.0	2.7	15
Fremont	0.0	10.0	2.1	4.0	17
Concord	2.1	11.1	0.0	4.4	17
San Jose	3.0	12.2	4.0	6.4	16
Alum Rock	0.0	17.4	4.3	7.2	18
Los Gatos	3.1	22.8	9.7	11.9	19

*Running 3-year average of days with maximum hourly ozone concentrations exceeding 12 pphm. Measured number of days at a given site is adjusted for instrument downtime.

**The design value is defined as that concentration which is expected to be exceeded once per year. Design values are shown only for nonattainment sites, that is, locations with an expected annual exceedance greater than 1.0.

Table 10. Observed and LIRAQ-simulated hourly average ozone concentrations (in pphm) at 21 Bay Area monitoring stations. The simulation uses the 1979 emission inventory and the meteorology of 9/29/78.

STATION (MAP SYMBOL)		HOUR BEGINNING (PST)															MAX	MEAN	CORR. COEFF.
		04	05	06	07	08	09	10	11	12	13	14	15	16	17				
VALLEJO (DVA)	OBS.	0	0	0	0	0	2	4	4	5	4	5	7	6	2	7	2.9	0.91	
	SIM.	0	0	0	0	1	1	2	3	3	3	3	3	3	2	3	1.8		
PITTSBURG (DPT)	OBS.	0	0	0	0	3	2	2	6	8	9	8	7	6	8	9	4.3	0.95	
	SIM.	0	0	0	0	1	1	2	3	3	4	5	5	4	4	5	2.3		
CONCORD (DCO)	OBS.	0	0	0	0	0	3	4	5	7	7	7	8	7	2	8	3.6	0.92	
	SIM.	0	0	0	0	1	2	3	3	4	5	5	5	5	4	5	2.7		
PLEASANT HILL (DPH)	OBS.	0	0	0	0	0	3	3	4	6	8	8	7	7	5	8	3.7	0.98	
	SIM.	0	0	0	0	1	2	3	3	4	5	5	5	5	4	5	2.7		
LIVERMORE (DLI)	OBS.	0	0	0	0	0	1	3	4	4	5	6	6	5	4	6	2.8	0.82	
	SIM.	0	0	0	1	2	3	6	9	10	8	7	6	5	4	10	4.4		
SAN RAFAEL (DSR)	OBS.	1	1	1	1	1	2	3	5	8	8	9	9	8	2	9	4.2	0.88	
	SIM.	0	0	0	0	1	2	4	4	5	5	5	5	5	4	5	2.9		
RICHMOND (DRM)	OBS.	1	0	0	1	1	2	3	5	7	8	9	7	2	1	9	3.4	0.80	
	SIM.	0	0	0	1	1	2	3	4	4	4	4	4	4	3	4	2.4		
SAN FRANCISCO (DSF)	OBS.	1	1	1	0	1	1	3	4	7	3	1	1	0	0	7	1.8	0.20	
	SIM.	0	0	0	0	0	1	1	3	4	6	7	7	5	4	7	2.7		
S. F. POTRERO (DFC)	OBS.	1	1	0	0	0	0	1	2	4	4	7	3	2	2	7	2.0	0.86	
	SIM.	0	0	0	0	0	0	1	2	3	5	6	6	4	2	6	2.1		
BURLINGAME (DBU)	OBS.	0	0	0	0	1	1	2	3	4	10	14	5	2	1	14	3.1	0.79	
	SIM.	0	0	0	0	1	1	3	5	6	7	8	8	6	3	8	3.3		
REDWOOD CITY (DRC)	OBS.	0	0	0	1	1	1	1	3	4	6	11	8	3	1	11	2.9	0.88	
	SIM.	0	0	0	0	1	1	2	5	9	12	12	11	8	6	12	4.7		
MOUNTAIN VIEW (DMV)	OBS.	1	1	1	1	1	3	5	6	7	7	7	8	10	5	10	4.5	0.88	
	SIM.	0	0	0	0	1	1	2	4	7	12	15	15	13	9	15	5.6		
SARATOGA (DSG)	OBS.	1	1	1	1	1	2	3	7	10	11	11	10	12	8	12	5.6	0.90	
	SIM.	0	0	0	1	1	2	2	4	5	8	11	14	14	11	14	5.2		
LOS GATOS (DLG)	OBS.	2	1	1	1	1	3	8	12	15	19	18	15	12	7	19	8.2	0.73	
	SIM.	0	0	0	1	1	1	2	4	6	8	10	12	14	13	14	5.2		
OAKLAND (OAK)	OBS.	1	1	1	1	1	1	2	4	6	7	5	2	1	1	7	2.4	0.71	
	SIM.	0	0	0	0	0	1	2	3	5	6	6	5	4	3	6	2.5		
SAN LEANDRO (DSL)	OBS.	0	0	0	0	1	2	4	6	9	10	12	9	4	0	12	4.1	0.88	
	SIM.	0	0	0	0	1	2	3	4	5	6	7	7	6	4	7	3.1		
HAYWARD (DHW)	OBS.	5	4	3	3	3	3	4	6	9	11	13	15	10	6	15	6.8	0.88	
	SIM.	0	0	0	1	2	2	4	6	9	10	10	10	9	8	10	5.1		
FREMONT (DFR)	OBS.	1	1	1	1	2	2	5	9	12	11	13	17	9	5	17	6.4	0.93	
	SIM.	0	0	0	1	2	3	5	7	10	13	14	14	13	10	14	6.5		
EAST SAN JOSE (DEJ)	OBS.	0	0	0	0	1	2	6	10	10	10	14	10	16	10	16	6.4	0.93	
	SIM.	0	0	0	1	1	2	4	7	12	16	17	18	17	14	18	7.7		
SAN JOSE (DSJ)	OBS.	1	1	1	1	1	3	7	8	10	9	13	11	12	8	13	6.1	0.88	
	SIM.	0	0	0	0	1	1	3	6	11	15	17	18	17	14	18	7.4		
PACIFICA (DPA)	OBS.	0	0	0	1	2	2	2	2	2	2	2	2	2	2	2	1.5	0.67	
	SIM.	0	0	0	0	1	1	3	4	5	5	5	3	2	1	5	2.2		
MAX	OBS.	5	4	3	3	3	5	8	12	15	19	18	17	16	10	19			
	SIM.	0	0	0	1	2	3	6	9	12	16	17	18	17	14	18			



TIME 16.0
SEPTEMBER 29

CONTOUR FROM 0. TO 0.1800 CONTOUR INTERVAL OF 0.0000E-01 PT(3.3)= 0.95510E-01

Figure 8. LIRAQ-Generated Mean Ozone Concentration from 3 pm to 4 pm PST

Therefore it was decided that, for the 1982 SIP, a broader index of this relationship would be employed. The index that was selected was the mean ratio of predicted to observed concentrations for only those station-hours when a value of at least 12 pphm was observed. This ratio is a measure of the model's overall tendency to over- or under-predict for those places and times when high concentrations were observed. The mean ratio has the advantage that it specifically measures performance for adverse conditions. Also, because it is an average of several ratios, it is not greatly affected by an occasional inaccurate measurement. For the 1979 baseline simulation the mean ratio was 0.79. Thus, when concentrations were relatively high the model tended to underpredict, on the average, by about 20%. The underprediction for peak values was less, only about 6%.

1987 Future-Year Simulation and Projected Design Value

Using the Sept. 29, 1978 prototype day, LIRAQ was also run with the projected emissions inventory for 1987. The 1979 base-year and 1987 future-year results are presented in Figure 9 and Table 11. These simulations suggest that the regionwide maximum in the San Jose area will improve by nearly 30%. The predicted maxima are still slightly in excess of the 12 pphm standard.

The design value for 1987 was estimated by assuming that the 1979 design value, 19 pphm, would decrease in proportion to the decrease in simulated concentrations from 1979 to 1987. The change in the mean observation/prediction ratio from 1979 to 1987 is a measure of the change in concentrations under adverse conditions. Thus, the projected 1987 design value was calculated to be $19 \text{ pphm} \times 0.630/0.829$, or 14.4 pphm (see Table 11).

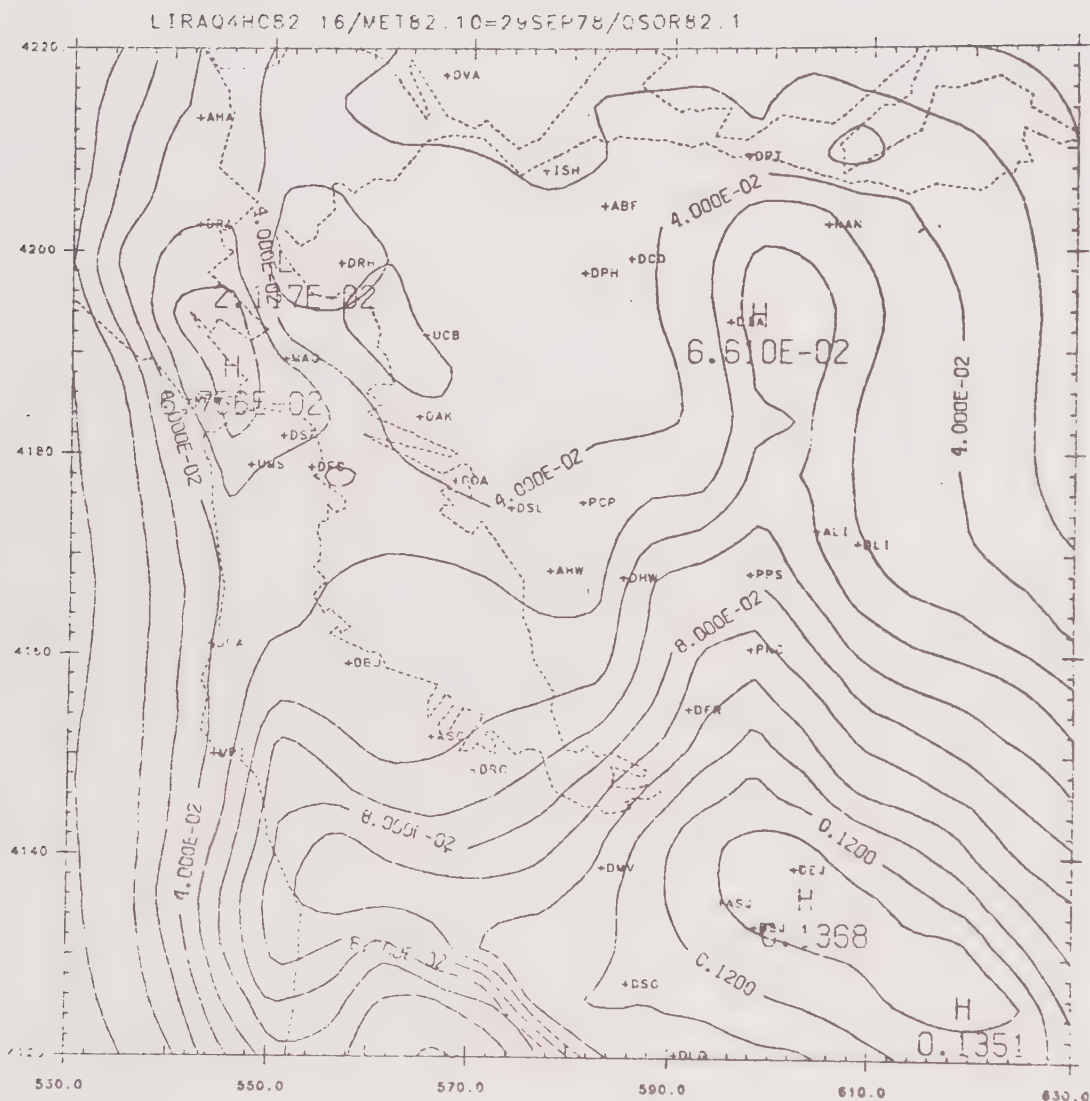


Figure 9. Projected 1987 Baseline Maximum Ozone Concentrations Under Existing Control Programs Based on LIRAQ Tests.

TABLE 11. BASELINE LIRAQ SIMULATIONS USING THE SEPT. 29, 1978
PROTOTYPE METEOROLOGY TOGETHER WITH EMISSION INVENTORIES
FROM THE 1979 BASE YEAR AND 1987 FUTURE YEAR.

Emissions Inventory Year:	1979	1987
Regionwide Maximum (pphm)	18.5	13.7
Station with highest simulated ozone	San Jose	East San Jose
Ozone concentration at highest station (pphm)	18.5	13.7
Simulated maximum 1-hour ozone at individual stations (pphm)		
Vallejo	3.4	2.9
Pittsburg	4.6	3.3
Concord	5.3	3.9
Pleasant Hill	5.3	3.9
Livermore	10.3	8.3
San Rafael	5.2	4.7
Richmond	4.1	3.0
San Francisco	6.8	5.6
S.F. Potrero	5.6	4.6
Burlingame	7.6	5.5
Redwood City	12.1	8.5
Mountain View	15.1	10.9
Saratoga	14.0	11.0
Los Gatos	13.8	11.1
Oakland	6.0	4.1
San Leandro	6.7	4.3
Hayward	10.1	7.1
Fremont	14.2	10.3
East San Jose	18.0	13.7
San Jose	18.5	13.4
Pacifica	5.3	4.1
Mean ratio of predictions to observations*	0.829	0.630
Design Value (pphm)	19	14.4**

*For only those station-hours when the observed concentration was at least 12 pphm.

**The projected 1987 design value was obtained by multiplying the 1979 base-year design value by 0.630/0.829.

LIRAQ OZONE SENSITIVITY ANALYSIS

This section summarizes the results of a LIRAQ* sensitivity analysis. The analysis used data derived from two sources: 1) a set of 42 LIRAQ simulations, some verifying the model to the 1979 baseline prototype days and others making preliminary projections to 1987 of ozone levels for baseline and control strategy scenarios, and 2) trajectory model simulations of the full LIRAQ model needed because some sensitivity information was not available from the set of full model simulations. Sensitivity information derived from the trajectory simulations correlated reasonably well with ones derived from the full LIRAQ simulations.

The "sensitivity coefficient" is the measure of sensitivity used here. It is defined to be the ratio of the percentage change in the ozone measure (the ozone measure is the average ratio of predicted ozone over observed, for observed ozone greater than or equal to 12 ppbm) over the percentage change in an input parameter. For example, if the ozone measure increased by 5 percent for 10 percent decrease in NO_x emissions, the sensitivity coefficient for NO_x emissions would be $-.50$.

Sensitivity to Initial Conditions. The initial condition fields are derived from BAAQMD pollutant observations for the start time of the prototype day simulated. The model uses an objective analysis algorithm to assign concentrations to all model grid cells from these few observations. The total mass in the model volume for the primary species can be computed for each simulation and is used as the initial condition parameter.

Multiple regression was performed on full simulations in which the variation in parameters was restricted to initial condition changes. The initial conditions of nitric oxide, nitrogen dioxide, and total speciated hydrocarbons were used as independent variables for this regression. The resulting sensitivity coefficients are listed in Table 13.

Sensitivity to Boundary Conditions. Only three tests were made of the effects of changing the boundary conditions. All three used different versions of the meteorology for the September 29 prototype day. The test which used the most current meteorology of the three varied all the boundary conditions. However, the trajectory model sensitivity tests indicate that the model is ten to one hundred times more sensitive to the top ozone boundary condition than to any other. Hence, in the above mentioned test, the variation in ozone appears mainly attributable to the change in top ozone boundary value. The resulting sensitivity coefficients are listed in Table 13.

*The version of LIRAQ used for this analysis was described previously, and is also known as LIRAQ4HC.

Sensitivity to Emissions. Sensitivity tests which varied only emission inputs were not done using the full LIRAQ model, except for the 1979 baseline simulations which differed only in the exclusion or inclusion of biogenic emissions (discussed below). However, a multiple regression was performed on all the data after the effects of initial conditions were removed where NO_x and total hydrocarbon emissions within the LIRAQ model were the independent variables. The resulting sensitivity coefficients are listed in Table 13.

Sensitivity to Hydrocarbon Species. The data from the set of full model simulations was insufficient to allow the determination of LIRAQ sensitivity to its individual hydrocarbon components: alkenes, alkanes, aromatics, and aldehydes. This information was obtained through trajectory model simulations for the September 12 and 29 prototype days on three different trajectories: San Francisco to San Jose, Richmond to San Jose, and Oakland to San Jose. The resulting sensitivity coefficients are listed in Table 12.

TABLE 12. SENSITIVITY COEFFICIENTS*

Parameter	Full Model range	mean	Trajectory Model range	mean
<u>initial conditions</u>				
nitric oxide		-.13	(-.19, -.61)	-.38
nitrogen dioxide		-.28	(-.11, -.25)	-.19
total hydrocarbons		.82	(.40, 1.3)	.91
<u>boundary conditions</u>				
ozone	(.09, .34)	.23	(.03, .41)	.20
<u>emissions</u>				
total hydrocarbons		.88	(.48, 1.4)	1.0
NO_x		-1.5	(-.79, -1.8)	-1.4
alkenes			(.30, .73)	.57
alkanes			(.06, .26)	.15
aromatics			(.09, .50)	.25
aldehydes			(.04, .14)	.08

* - Sensitivity coefficient is defined to be the ratio of the percentage change in the ozone measure due to a change in parameter divided by the percentage change in the parameter.

The LIRAQ model seems to be most sensitive to NO_x emissions, total hydrocarbon emissions, and total hydrocarbon initial conditions with absolute sensitivity coefficients about one. Note that the sensitivity to NO_x is negative, so reductions of NO_x emissions will increase ozone production. This implies that the ozone control program will not benefit from NO_x reductions.

The other parameters, initial condition of nitric oxide, initial condition of nitrogen dioxide, and the ozone boundary condition, are of secondary effectiveness with absolute sensitivity coefficients about .3.

The model shows large variability in sensitivity among the component hydrocarbon emissions with about a factor of two difference in sensitivity between any two adjacent coefficients. The sensitivities of the model to the component hydrocarbon emissions in decreasing order are alkenes, aromatics, alkanes, and aldehydes. Hence, control programs which emphasize control of hydrocarbon species in the above order would be more effective per ton reduction than control programs which did not.

Influence of Biogenic Emissions. Four simulations were done without biogenic emissions in the emission inventory. Two different versions of a 1979 baseline emissions inventory were used, as were inventories for a 1987 baseline emissions estimate and a 1987 control strategy. Table 13 gives a pairwise comparison between the simulations with and without biogenic emissions.

TABLE 13. COMPARISON OF SIMULATIONS WITH AND WITHOUT BIOGENIC EMISSIONS

Description	Ozone Measure		Percent Change
	With Biogenics	Without Biogenics	
1979 baseline	.783	.652	-17.
1979 baseline	.706	.592	-16.
1987 baseline	.547	.405	-26.
1987 control	.384	.293	-24.

All four simulations without biogenic emissions resulted in lower ozone than their biogenic counterparts, with an average decrease of 21 percent.

In order to show the influence of biogenic emissions upon the LIRAQ model the fractions of hydrocarbon emissions contributed by biogenic sources are presented in Table 14.

TABLE 14. FRACTIONAL CONTRIBUTION OF BIOGENIC EMISSIONS TO TOTAL INVENTORY

Inventory	Emission Component		
	Alkenes	Alkanes	Aromatics
Regional			
1979 Baseline	.74	.12	.25
1987 Baseline	.80	.16	.32
Modeling Domain*			
1979 Baseline	.40	.05	.12
1987 Baseline	.50	.06	.16

*The 100 km x 100 km area used by the LIRAQ model.

The biogenic sources contribute a substantial fraction of the alkene emissions, which is the hydrocarbon component to which the model seems to be the most sensitive. The predicted changes in the ozone level by the sensitivity coefficients are larger than the changes shown in Table 13. This discrepancy may be attributable to the spatial distribution of the biogenic emissions which are lower in populated areas, thereby lowering their influence upon the ozone measure.

Stationary versus Mobile Control. The difference in effectiveness between mobile and stationary source hydrocarbon controls was examined with two different control scenarios. In one case a 43 tons/day reduction due to inspection and maintenance was simulated, and in the other case a 58 ton/day stationary source reduction was simulated. These reductions are annual average BAAQMD values. The results are tabulated in Table 15.

TABLE 15. COMPARISON OF THE EFFECTS OF MOBILE AND STATIONARY EMISSION REDUCTIONS ON OZONE

Simulation	Model HC Emissions (tons/day)*	Ozone Measure	Sens. Coeff. to HC emissions	Effectiveness (% change/ton)**
1987 baseline	677	.547		
mobile control	632	.525	.60	-.094
stationary control	615	.529	.36	-.057

* - The tons unit represent speciated hydrocarbon emissions within LIRAQ model domain. This is a 100 kilometer by 100 kilometer area covering most of the populated areas within the Bay Area.

** - The ton unit represent regional BAAQMD annual average emission tonnages.

In this comparison the model is more sensitive to mobile source emission changes than to stationary source emission changes, which is an indication that the hydrocarbon mix from mobile sources is much more ozone-productive than the mix from stationary sources. The effectiveness with respect to BAAQMD annual average emission tonnage is also computed. The result is that mobile source controls are about 60 percent more effective per ton than the average stationary source control.

Implications for Control Programs. The relatively large negative sensitivity coefficient for the NO_x indicates that reducing NO_x emissions will increase ozone, so the ozone control program for 1987 will not benefit from a NO_x emissions control strategy. In fact, it will probably be detrimental.

The sensitivity coefficients for the component hydrocarbons, alkenes and aromatics, are significantly larger than for either alkanes or aldehydes. Control programs will be more effective per ton if they focus on controlling these two hydrocarbon species.

Mobile source hydrocarbon control is about 60 percent more effective per ton than the average stationary source control because of its hydrocarbon mix. However, programs that reduce mobile source hydrocarbon and NO_x emissions simultaneously (e.g., reductions in vehicle-miles-traveled) will likely have little or no impact on reducing ambient ozone levels.

Hydrocarbon Emission Reduction Target

This section describes the method for determining the hydrocarbon emission reduction target.

A three-step process is applied to predict 1987 design values for ozone with the LIRAQ model:

- (1) establish a 1979 baseline simulated ozone level;
- (2) simulate 1987 ozone levels using projected 1987 inventories for baseline and control strategy scenarios; and
- (3) compute the 1987 ozone design values for the different scenarios by multiplying the current design value with the ratios of different 1987 simulated scenario ozone levels to the 1979 baseline simulated ozone level.

The current design value is .193 ppm ozone and the attainment level is .12 ppm. Hence, the ratio for attainment is $.120/.193 = .622$. Since every 1987 baseline simulation yielded a ratio above this value, the problem becomes one of determining the amount of additional emission reductions needed to reach attainment. The emission reductions are only for hydrocarbons since it has been established through the sensitivity analysis that NO_x emission reductions will increase regional ozone production (this is consistent with results of the 1979 Plan).

The planning process unavoidably required that a number of 1979 baseline, 1987 baseline, and 1987 control strategy simulation sequences be performed (each sequence differed slightly in the 1979 baseline emission inventory). The ratio of ozone levels has been plotted against the ratio of total regional speciated hydrocarbon emissions for these sequences, as shown in Figure 10. All ratios were formed as 1987 values over 1979 baseline values. A second order polynomial was fitted to the data and this graph intersected the attainment level ratio of .622 at a total hydrocarbon fraction of $.694 \pm .013$. This average result assumes that all sequences are considered equal, i.e., the variation in the 1979 baseline inventory is due to uncertainty in emission estimates. It serves as a first estimate of the attainment emissions level.

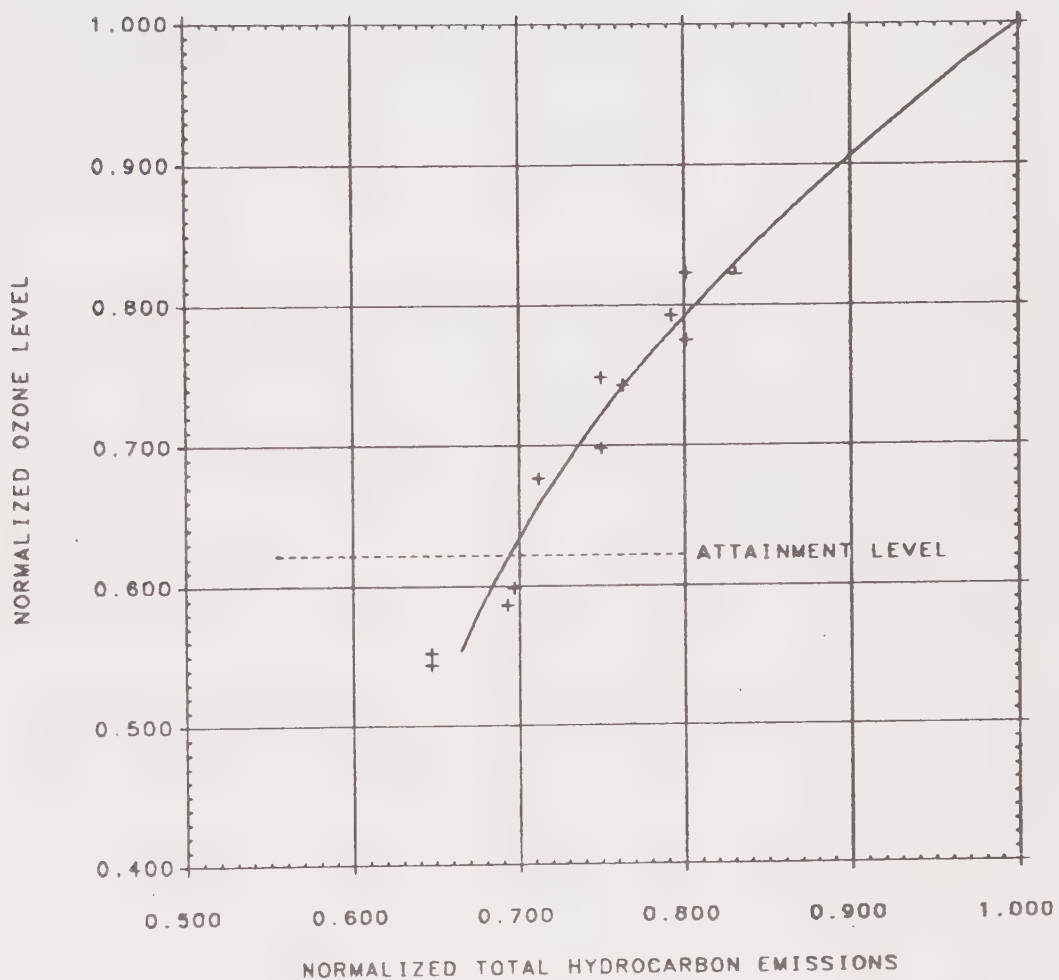


Figure 10. Ozone Level Versus Total Hydrocarbons
Normalized to 1979 Baseline

(Normalized values formed by division of predicted ozone levels and hydrocarbon emissions by their respective 1979 baseline values)

The 1979 baseline LIRAQ emission inventory contained a total of 1393 tons per day of speciated hydrocarbons, and so the estimated hydrocarbon emission level for attainment is 967 ± 18 tons per day. The 1987 baseline emission inventory contained 1091 tons per day of speciated hydrocarbons. Hence, the additional reduction necessary to reach attainment is 124 tons per day. The corresponding reduction in terms of annual average BAAQMD hydrocarbon emissions is approximately 85 tons per day, for the group of control measures being considered. (The measures recommended in Section IV have higher reactivity and/or higher temporal weighting factors for September weekday emissions. The nominal emission reduction of 85 tons/day is thus "amplified" to about 125 tons/day in terms of efficiency in reducing ozone.)

PRESENT AND PROJECTED CO PROBLEMS

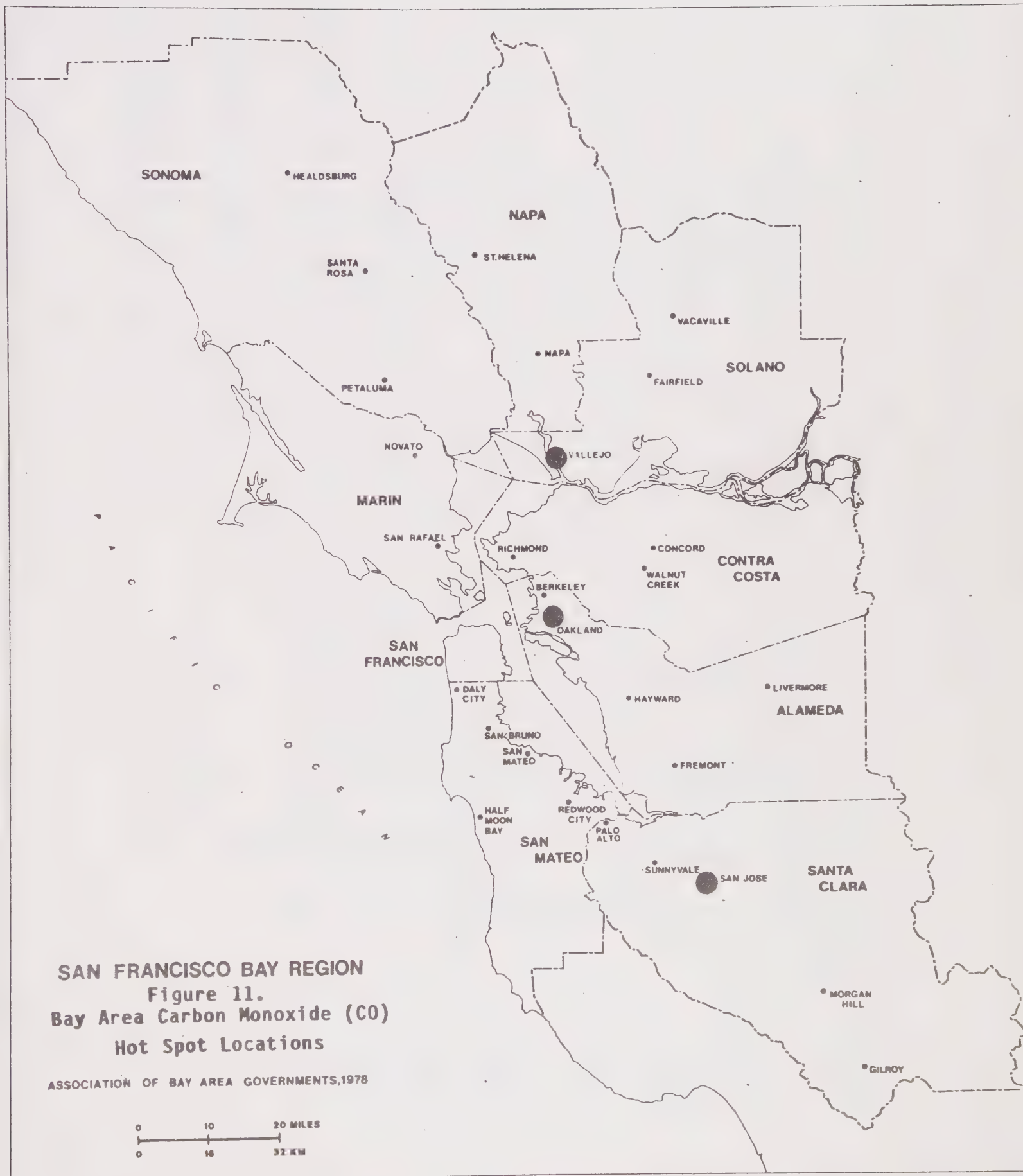
In the 1979 Plan, future carbon monoxide concentration levels were predicted by performing linear rollback, based on existing ambient carbon monoxide monitoring data and on estimates of regional emissions. The problems with this approach were twofold. First, it was not known whether the existing monitoring stations were sited in worst case locations; second, emissions everywhere in the region would have to be reduced to a level specified by the rollback calculation. Since the calculation was based on a measurement taken at one location, it failed to take into account the localized and potentially diverse nature of carbon monoxide problems. High concentrations of carbon monoxide typically occur in areas with high traffic densities.

Following the 1979 Plan recommendations, a series of special monitoring programs were implemented in the winter seasons between 1979 and 1982. The purpose was to identify localized problem areas, or "hot spots." Monitoring data from these programs and from permanent monitoring stations led to the following findings:

- o The one-hour carbon monoxide standard (40 mg/m^3) was not exceeded at the selected hot spots.
- o Exceedances of the eight-hour standard (10 mg/m^3) were measured in San Jose, Oakland and Vallejo.

Figure 11 shows the location of these areas with respect to the entire region. Figures 12 and 13 show the hot spot sites in San Jose and Oakland. The BAAQMD permanent monitoring site in Vallejo was considered to be sited in a hot spot, so no additional monitoring was conducted there. The monitoring data also yielded the following conclusions:

- o A high level of ambient carbon monoxide builds up over the densely urbanized portions of the Santa Clara Valley on cold, meteorologically stagnant winter evenings.





 Hot Spot Site
 (1979-80 Winter Season)

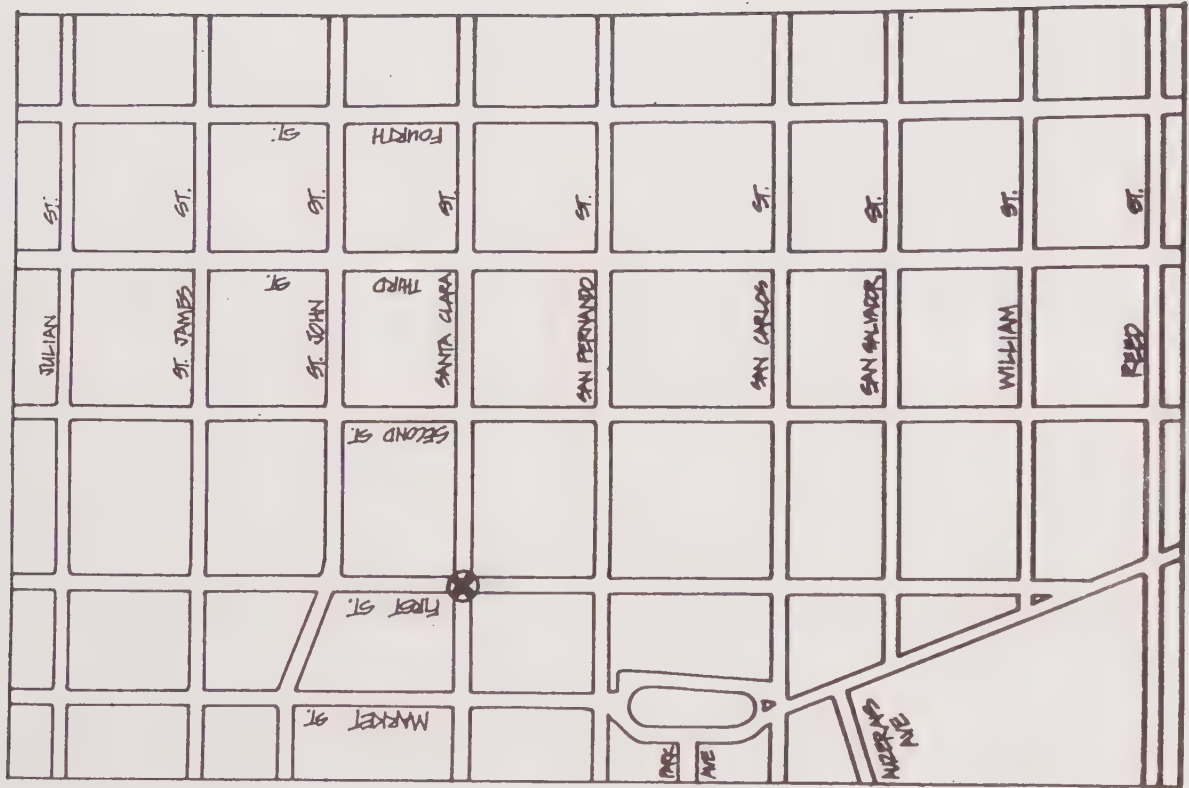


Figure 12. San Jose Study Area and Monitoring Site



Figure 13. Oakland Monitoring Site

- o Due to differences in meteorological conditions, other parts of the region with comparable levels of traffic congestion do not experience CO problems as severe as those in San Jose.
- o The CO problem in the Santa Clara Valley is not isolated to a few hot spots but appears to be spread over a large portion of the urban area.

Carbon Monoxide Modeling Approach

There are problems with applying both the modified linear rollback and dispersion modeling techniques to the study of CO problems at urban intersections. Neither approach is able to accurately simulate the complex wind flows and eddies that exist within a street canyon. A reasonably accurate dispersion modeling effort would have required extensive meteorological and monitoring input data, which was beyond the scope and timeframe of the plan. The collection of hot spot data, on the other hand, made possible the determination of baseline concentrations and emissions levels. This determination enabled a reasonably good application of the linear rollback approach to forecast future carbon monoxide levels in San Jose and in Oakland. The rollback approach was judged adequate for Vallejo in view of the fact that the City's design value was so close to the standard.

The linear rollback model assumes that ambient concentrations are directly proportional to emissions without explicit examination of dispersion patterns. Dispersion models incorporate meteorological and topographical factors. Instead of being applied regionally, linear rollback was applied to a local emissions inventory developed for specific locations where a carbon monoxide problem has been identified. Since the standard is usually exceeded in areas with significant levels of traffic congestion, the focus of carbon monoxide analyses is usually on intersections in urban settings.

The carbon monoxide concentration level at an intersection was divided into two parts:

- (1) a local concentration directly attributable to vehicles at the intersection; and
- (2) a background concentration attributable to areawide diffusion of carbon monoxide emissions from all vehicle sources.

This can be represented as follows:

$$C_t = C_o + C_b \quad (1)$$

where C_t = the total concentration

C_o = the local concentration

C_b = the background concentration

CO concentrations in an urban area can be viewed as consisting of an urban background level with microscale peaks superimposed. (See Figure 14.) The local concentration is directly proportional to intersection traffic volumes and vehicle emission rates. The background concentration is a function of areawide traffic volumes and vehicle emission rates.

The modeling approach was to treat the local and background components separately. That is, rollback was applied to the local and areawide emissions inventories separately, to determine the local and background concentrations, respectively. The relationship between emissions and concentrations is shown in equation (2) below:

$$C_t = K_1 \overset{C_o}{E_{Local}} + K_2 \overset{C_b}{E_{Area}} \quad (2)$$

where C_t = the total concentration

C_o = the local concentration

C_b = the background concentration

E_o = the local (intersection) emissions inventory

E_{Area} = the area emissions inventory

K_1, K_2 = meteorological factors

Separate rollback models were developed for San Jose, Oakland and Vallejo. For San Jose and Oakland, ambient CO and traffic data collected from the 1979-1980 hot spot monitoring program were the basis for model development and verification. In Vallejo, where no hot spot monitoring was performed, rollback was applied to an emissions inventory for the entire city.

There are four critical issues in the application of the model for control strategy assessment: the designation of design values, the contribution of background to ambient concentrations, the areawide emissions inventories, and the local (intersection) emissions inventories. These determine the scope and magnitude of the proposed control measures.

Carbon Monoxide Design Values. The regional carbon monoxide design value is 18 mg/m³ (eight-hour). Defined to be the maximum of all second highest values for each year in the period 1978-80 for all Bay Area stations, the design value was measured at the BAAQMD San Jose monitoring station. Of the fourteen fixed monitoring stations, six (San Rafael, Redwood City, San Jose, Vallejo, Oakland₃ and San Francisco) recorded an eight-hour average exceeding 10 mg/m³ (in 1978-1980). Of these, only San Jose and Vallejo recorded a₃ second highest, non-overlapping eight-hour average exceeding 10 mg/m³ in 1978-1980.

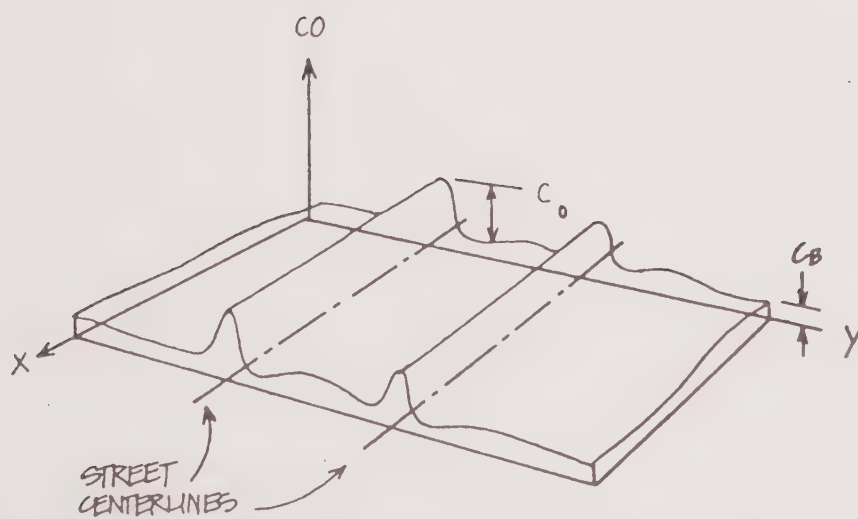


Figure 14. Spatial Variation of Carbon Monoxide in an Urban Setting

Hot spot monitoring stations also yielded eight-hour design values, but these were calculated for one winter season only. They are 17 and 16 mg/m³ for San Jose and Oakland, respectively. The hot spot design values formed the basis for calibrating and verifying the carbon monoxide air quality models, except for Vallejo, where permanent station data were used instead.

Carbon Monoxide Background Concentrations. Conventional hot spot analyses assume that carbon monoxide concentrations are dominated by local (intersection) vehicular emissions rather than areawide emissions. This may be true in the case of the one-hour averaging time, but for the eight-hour average, neither local nor areawide emissions can be expected to be consistently dominant.

In San Jose, where the most intensive hot spot monitoring programs have been performed, it was found that under neutral or unstable atmospheric conditions (such as on clear days or windy conditions), CO concentrations were indeed higher at the monitored hot spot than at the permanent station located several blocks away. This is consistent with the conventional wisdom that carbon monoxide concentrations are localized. However, during very stable, calm winter evenings, when the standards are most likely to be exceeded, hot spot and station concentrations were found to be comparably high. A review of all available San Jose area monitoring data confirmed this pattern. Thus, under adverse meteorological conditions, during short winter days, when evening commuter traffic extends into the hours of darkness and in an extensively urbanized area with a well developed highway and street network, a uniform cloud of carbon monoxide can be expected to develop, extending from several city blocks to several kilometers.

In San Jose the background concentration is estimated to be 75% of the ambient concentration under adverse meteorological conditions. In Oakland, the background concentration is estimated to be 50%. The Oakland estimate is based on: (1) the existence of greater horizontal and vertical mixing effects due to winds from the Bay, and (2) the lower probability that an air parcel reaching the downtown area would have traveled over and collected emissions from a high-emission urban area in the previous hours. In Vallejo, where no data on background are available, a 50% background contribution is also assumed.

Areawide Emissions Inventory. The areawide emissions inventory was derived from the LIRAQ inventory of mobile source emissions, which is based upon regional estimates of vehicle miles of travel and trips. The areawide inventory was calculated for a subset of the region, approximately 25 square kilometers in size centering on the monitoring site. The inventory was developed for a typical November day, when exceedances of the carbon monoxide standard are most likely to occur.

Local Emissions Inventory. The local emissions inventory takes into account traffic conditions at intersections, which are not accounted for in the regional forecasts of vehicular travel. Two types of emissions are considered in developing the local (intersection) emissions inventory:

- o free-flow emissions - produced by a vehicle traveling at a relatively constant rate, without interruption;
- o excess emissions - produced by a delayed vehicle in the acceleration, deceleration and idling modes. These emissions are over and above those which would have occurred had the vehicle not stopped.

Since carbon monoxide emission rates increase with decreasing speeds, a significant portion of total emissions at a signalized intersection can be due to excess emissions. Traffic information on volumes, capacities, speeds, turning movements and traffic signal patterns, were used to estimate queue lengths and delay times which determine the amount of excess emissions produced at an intersection. Emission factors are influenced by vehicle mix, average speed, temperature and vehicle operating mode (idling, acceleration, deceleration, cruising).

Baseline 1987 Carbon Monoxide Forecast

Based on the carbon monoxide modeling approach described above, forecasts of baseline 1987 carbon monoxide concentrations were made for San Jose, Oakland, and Vallejo, as shown in Table 16. In the case of San Jose, the study area was expanded from the hot spot site to a 45-block area in downtown San Jose in order to take into account: (1) the high urban background level, and (2) the large projected increase in traffic as a result of downtown redevelopment. Carbon monoxide concentrations for the major intersections in this area are shown in Figure 15. In Vallejo, where no hot spot monitoring was performed, the ambient concentration was projected for a 25-square kilometer area centered around the permanent monitoring site.

TABLE 16. BASELINE 1987 CARBON MONOXIDE CONCENTRATIONS FOR SAN JOSE, OAKLAND AND VALLEJO (mg/m³)

	<u>San Jose</u>	<u>Oakland</u>	<u>Vallejo</u>
1979 Design Value	17.	16.	12.
1987 Forecast	12.2	9.3	7.3

The projections show that carbon monoxide levels are expected to decrease by 1987. This improvement is due to the existing federal and California motor vehicle control programs. In San Jose, however, the trend toward cleaner cars is not sufficient to counter the increase in emissions due to growth in traffic.

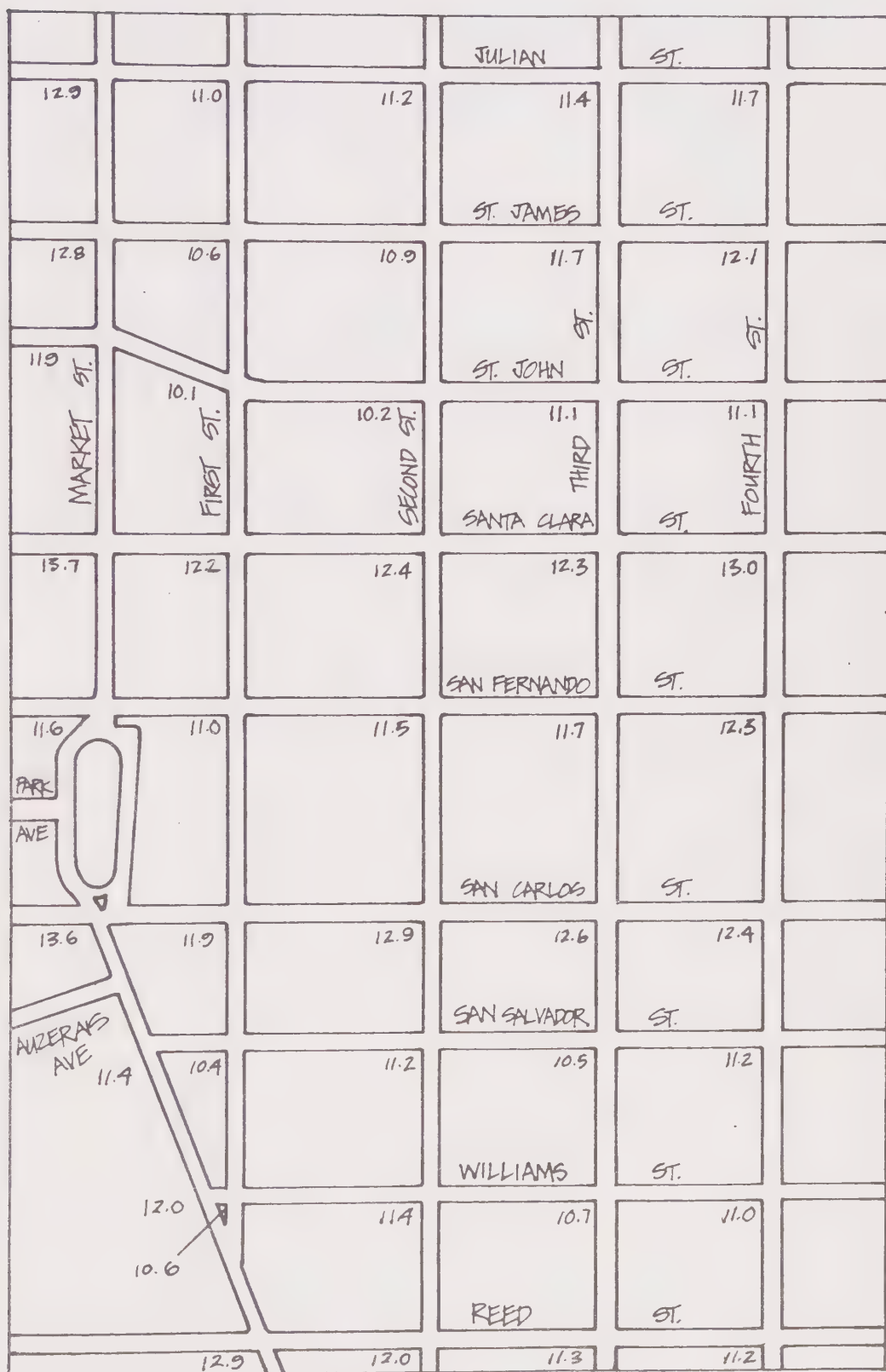


Figure 15. 1987 Baseline CO Concentrations in Downtown San Jose mg/m^3

The baseline background concentration levels forecast for 1987 are shown in Table 17 along with 1979 background values.

TABLE 17. CO BACKGROUND CONCENTRATION LEVELS FOR 1979 AND BASELINE 1987 (mg/m³)

	<u>San Jose</u>	<u>Oakland</u>	<u>Vallejo</u>
1979 Value	12.8	8.	6.
1987 Baseline	9.8	4.5	3.7

An important factor in estimating carbon monoxide baseline trends is the assumption of future traffic growth. This is particularly critical for San Jose and Oakland because both cities are planning significant growth in retail and commercial activity through 1990. The major traffic assumptions for each city are described below.

San Jose - Current and projected baseline traffic data for the downtown area were provided by the City of San Jose. The baseline case assumes 1990 traffic volumes (the city's base year designation), which conform with the land uses designated in the City's 1981 adopted General Plan. Three major projects assumed in the baseline case are:

- o Transit Mall - A transit mall will be constructed along First Street between St. James and Williams which will provide limited access to private automobiles (see Figure 16). There is provision for light rail transit although light rail is not assumed in the baseline case.
- o Guadalupe Corridor - The Guadalupe Corridor is 20 miles long and generally oriented in a north/south configuration. The corridor runs from just north of Santa Teresa Boulevard in the Almaden/Edenvale area of South San Jose, along the existing Route 85 right-of-way, northerly along the Route 87 right-of-way, through the downtown (where it is planned to connect with the proposed Transit Mall) and continues northerly along the Route 87 right-of-way, terminating at Great America Parkway in Santa Clara.

The baseline case assumes the following parts of the Guadalupe Corridor will be completed by 1987: a four-lane highway between I-280 and Curtner Road, a 750 bus fleet countywide and upgraded Southern Pacific service on the existing line.

- o San Antonio Plaza Redevelopment Area - The San Antonio Plaza Redevelopment Area is a nine block section of downtown San Jose located at the southern edge of the financial and retail district (see Figure 16). Redevelopment plans call for a hotel and additional housing, and extensive retail and office space. They also assume that limited parking will be provided (to encourage transit use) and that the transit modal split will be 30% during the peak hour.

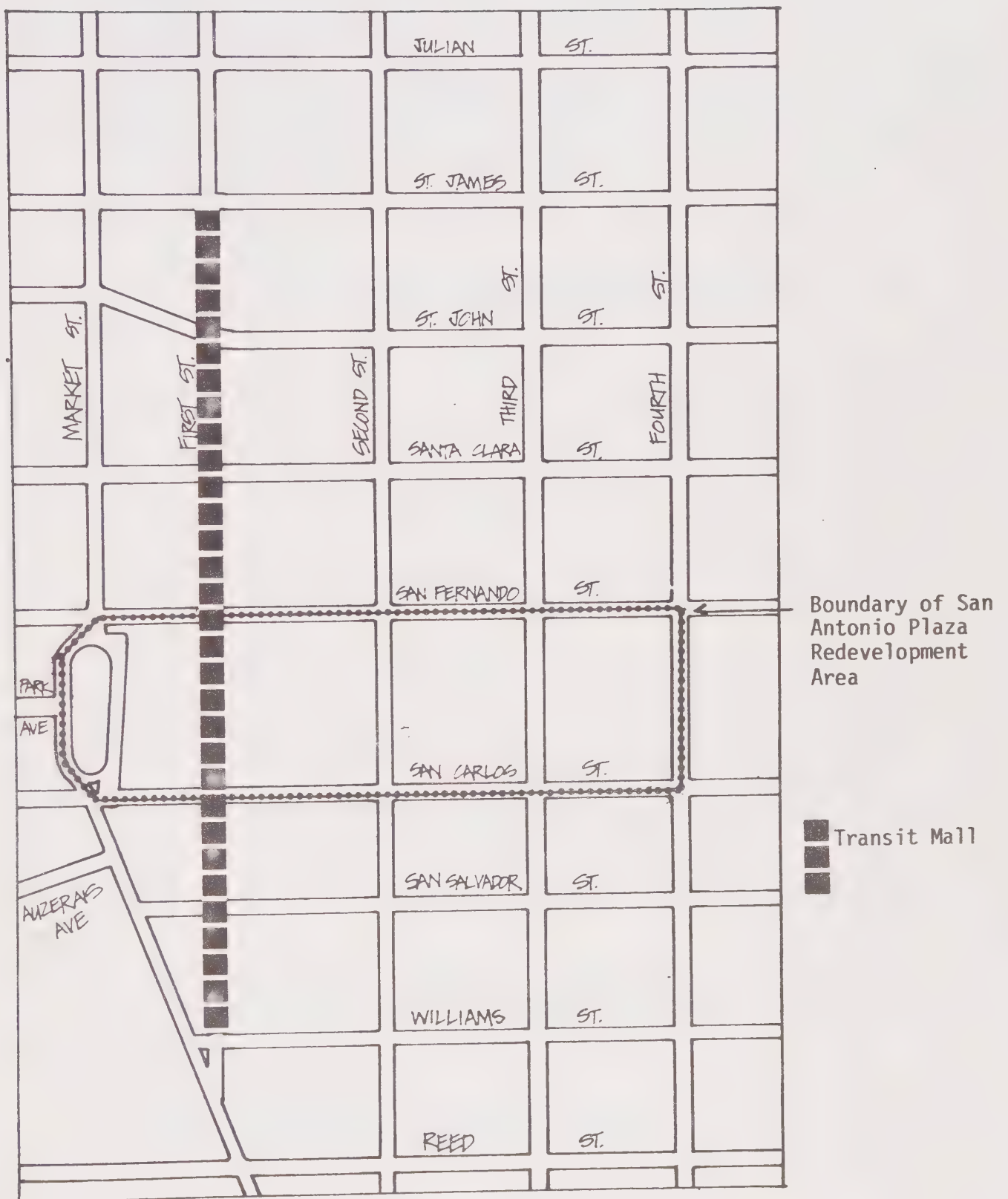


Figure 16. Transit Mall and San Antonio Plaza in Relation to Downtown San Jose

The City's traffic projections were generated using a computerized traffic forecast modeling package called TRANPLAN. The model is provided with proposed land use distributions within the county, a street system and information on county travel behavior (i.e., vehicle trip generation rates). The diversion of vehicle-trips to transit is reflected by a reduction in the vehicle trip generation rate per household that is input to the model. Other factors influencing vehicle trip generation rates were identified for the horizon year 1990 by the City and a consultant (SRI International) in an effort to incorporate long term economic, social and demographic trends in their transportation planning process. These factors are summarized in Table 18.

**TABLE 18. FACTORS AFFECTING FUTURE TRIP-MAKING ACTIVITY
IN THE SAN JOSE TRAFFIC FORECAST MODEL**

FACTORS THAT REDUCE PRIVATE VEHICLE MODE TRAVEL

- o Increased fuel cost
- o Temporary or permanent gasoline rationing and spot shortages
- o Continued decline in average household size
- o County policies that attempt to bring jobs and entertainment/recreation opportunities closer to the urban areas
- o Increase in the proportion of families with two or fewer children
- o Increase in the proportion of older (retired) persons in the population
- o The ability of increasing the number of members of the professional groups to work at home

FACTORS THAT INCREASE PRIVATE VEHICLE MODE TRAVEL

- o Fuel efficient cars
- o Increase in number of workers per household (as a result both the entry of more women into the work force and the increase in the number of unrelated individuals living together)
- o An increase in the number of families with younger children (under 10) as the post-war baby boom generation reaches child bearing age

The trips are distributed to routes on the street system using a capacity constrained route assignment which reflects the impact of traffic congestion on route choice.

Oakland - The baseline case assumes a traffic growth rate of 1 1/2% percent per year through 1987. This includes the effects of full development and occupancy of the City Center Project and Trans-Pacific Centre, as planned in early 1981. Also assumed are:

- o completion of the Grove/Shafter Freeway from 18th Street to the Nimitz Freeway;
- o making 11th Street one-way eastbound with four lanes of traffic and 14th Street one-way westbound, also with four lanes.

The projections of future traffic patterns in downtown Oakland for the baseline case are tentative due to the fact that numerous major commercial projects are currently being planned with significant potential traffic impacts. Plans for the Trans-Pacific Centre have been modified since the baseline inventory was developed. Therefore, the baseline 1987 forecast is tentative also.

Vallejo - The baseline case for Vallejo assumes an annual traffic growth rate of 1 1/2%.

Implications for Control Strategy Design

The 1987 forecast of baseline carbon monoxide concentration levels show that the federal eight-hour standard will be attained in Oakland and Vallejo. The existence of a high and pervasive carbon monoxide background level in the urbanized area of San Jose has implications for control strategy design. Simple redistribution of traffic to reduce local congestion is unlikely to produce air quality benefits. Steps must be taken to reduce vehicle emissions on a sub-regional, urban scale--perhaps as large as 200 square kilometers. This result strongly suggests that the most effective approaches to reducing CO levels in San Jose are:

- o reducing vehicle emission rates to very low levels via enforcement of new vehicle emission standards, and implementation of a vehicle inspection and maintenance program; and
- o adopting and implementing aggressive policies to promote travel modes other than the private vehicle.

SECTION IV

OZONE CONTROL STRATEGY DEVELOPMENT

As mentioned in Section III, there is no single, major source of the ozone problem. Instead, there are many sources of different type and magnitude spread over the entire region. Moreover, the long history of air pollution control in the Bay Area means that the most effective and cost-effective control options have already been implemented. The remaining options will generally cost more and have less effect than those now being implemented. By 1987 the maximum hourly ozone level is projected to be 14.4 pphm, 2.4 pphm above the federal standard. To achieve this final increment of air quality improvement, hydrocarbon emission reductions of approximately 85 tons/day are required. (This value will vary slightly depending on the mix of sources and hydrocarbon species that are controlled.)

This section summarizes the alternative control measures considered for the plan, assessment of their costs and effectiveness, and their placement into three categories:

- o control measures recommended for implementation
- o control measures to be held in reserve as contingency
- o control measures considered not reasonably available

MOTOR VEHICLE INSPECTION AND MAINTENANCE

A motor vehicle inspection and maintenance (I/M) program is a vital link in the overall strategy for control of vehicle emissions. Such a program was adopted in the 1979 Plan. The California Legislature has considered proposals for an automobile inspection and maintenance program for more than a decade. As a result of the 1977 Amendments to the Clean Air Act, efforts to authorize such a program have increased. To date, however, the Legislature has not authorized such a program.

Since the California legislature has thus far been unable to adopt the necessary authorizing legislation for I/M, this program is proposed once more for the 1982 Plan. The most recent version of I/M legislation is SB 33 (Presley), which has been passed by the Senate and is currently awaiting action in the Assembly. Cost and effectiveness estimates for I/M vary widely depending upon the assumptions made about how it will ultimately be designed, implemented, and enforced.

Based on recent information from EPA and the California Air Resources Board, the range of probable hydrocarbon emission reductions achievable from this program is 29 to 41 tons/day. (The estimated CO reduction is 480 tons/day.) This range is due to: (1) differing analyses and assumptions concerning the details of how I/M would be implemented; and (2) differing interpretations of data by EPA and ARB. There is no firm technical basis for selecting one estimate of

effectiveness over the other; rather, the issue for the Plan is what level of effectiveness should be assumed. This assumption will have a direct bearing on what other controls will be needed to achieve the ozone standard.

The key considerations in deciding the level of I/M effectiveness for the plan are summarized in Table 19.

On May 26, 1982, the Joint Air Quality Planning and Advisory Committee met to discuss the elements to be recommended in the draft 1982 Bay Area Air Quality Plan. At this meeting the JAQPAC recommended that a hydrocarbon emission reduction effectiveness of 41 tons/day be assumed. This corresponds to an annual inspection program with a 30% failure rate, which results in 35% reduction in exhaust hydrocarbon emissions and a 32% reduction in carbon monoxide emissions from light- and medium-duty vehicles.

While the specific design elements of an I/M program are not yet developed, certain facets can be outlined at this time. First, the program is estimated to cost \$77,000,000 per year for the Bay Area on an annualized basis. This cost includes \$15 per vehicle per year for the inspection, and an average repair cost of \$30 per failed vehicle. The cost effectiveness of this program is \$2,600 per ton of hydrocarbons and \$200 per ton of CO. The program would initially be financed statewide through the appropriation of funds from the State Motor Vehicle Account to the Director of Finance, who would loan the funds to the implementing agency, the Department of Consumer Affairs.

Important potential impacts are possible in the areas of consumer protection and economic impact on low income people. The consumer protection issue is the potential for conflict of interest for the repair industry in performing both the inspection and the repair. Protective measures to mitigate this impact would be automated inspection equipment, the setting of quality assurance procedures, and the provision of referee facilities to review consumer complaints and to settle disputes concerning test results.

Inspection and repair costs may place a special financial burden on lower-income persons, who are more likely to own older vehicles. The possible consequences of an I/M program might be a) an increased incidence of motorists driving without valid registration, b) greater use of public transportation, c) reduced mobility for low-income persons who have no access to public transportation.

STATIONARY SOURCE CONTROL MEASURES

Alternative Control Measures

Forty-two control measures were developed and analyzed for potential hydrocarbon reductions from stationary sources. The measures are listed in Table 20 and explained in greater detail in Appendix A.

TABLE 19. SUMMARY OF CONSIDERATIONS FOR I/M
EFFECTIVENESS ASSUMPTION

<u>Consideration</u>	<u>41 Ton Assumption</u>	<u>29 Ton Assumption</u>
Technical	based on EPA estimate of 35 percent effectiveness for annual I/M program with 30 percent failure rate*	based on ARB estimate on 25 percent effectiveness for annual I/M program with 20 percent failure rate
Impact on Plan	● approximately 44 tons additional stationary source regulations needed for attainment. ● 26 tons stationary source regulations reserved for contingency plan.	● approximately 56 tons additional stationary source regulations needed for attainment. ● 14 tons stationary source regulations reserved for contingency plan.
Impact on I/M Legislation	● I/M program endorsed by Bay Area ● <u>annual</u> program needed to achieve 35 percent effectiveness.	● I/M program endorsed by Bay Area ● ARB estimates <u>annual</u> program needed to achieve 25 percent effectiveness. ● EPA estimates <u>biennial</u> program could achieve 25 percent effectiveness (29 tons) if <u>43.6 percent failure rate enforced</u>.

*With a 20 percent failure rate, the EPA estimate of I/M effectiveness is 33%, which translates to 39 tons/day hydrocarbon reduction.

TABLE 20. SUMMARY OF ALTERNATIVE STATIONARY SOURCE CONTROLS CONSIDERED

1. **Organic Chemical Manufacturing:** New rule requiring control of volatile organic compound (VOC) fugitive emissions from pumps, compressors, process vessel depressurization and process relief valves. Limits would be similar to existing limits for petroleum refining plants.
2. **General Solvent and Surface Coating Operations:** Modify Regulation 8 - Rule 4 by lowering hourly and daily VOC emission limits.
3. **Letterpress/Offset Printing:** Modify Regulation 8 - Rule 20 by deleting letterpress/offset exemption and adding specific VOC emission limits.
4. **Natural Gas and Crude Oil Production & Processing:** New rule requiring control of VOC fugitive emissions from valves, flanges, pumps, compressors, relief valves, and storage tanks. Limits would be similar to existing limits for petroleum refining plants.
5. **Polymer and Resins Manufacturing:** New rule requiring control of VOC emissions from reactor vessels, etc. by condensation, adsorption.
6. **Wood Furniture Coating:** New rule requiring 50% reduction of VOC through the use of low solvent coatings and high transfer efficiency spray methods.
7. **Volatile Organic Waste Disposal:** New rule requiring stripping and recovery of VOC from wastes prior to disposal.
8. **Aerosol Cans:** New rule banning the use of VOC propellants. Substitute pump, stick, roll-on containers or use N₂/CO₂ propellants.
9. **Marine Lightering:** New rule requiring use of deep draft lighter vessels to reduce lightering emissions.
10. **Ship, Barge, Tanker and Railcar Loading:** New rule(s) requiring 90 to 95% control of VOC emissions by vapor balance, condensation, etc.
11. **Gasoline Distribution:** Modify Regulation 8 - Rule 6 and Rule 7 by lowering exemption cut-offs to require Phase I and Phase II controls at additional service stations.
12. **Architectural Coatings:** Modify Regulation 8 - Rule 3 by lowering the VOC content limit for flat coatings from 250 to 125 grams per liter.
13. **VOC Storage:** Modify Regulation 8 - Rule 5 by lowering control requirement cut-offs from 1.5 psia and 40,000 gallons to 0.5 psia and/or 10,000 gallons.
14. **Automobile Refinishing:** New rule requiring 50% reduction of VOC emissions by lowering VOC content of automobile refinishing coatings.
15. **Pesticides:** New rule banning the use of weed oil, requiring the use of water or other non-VOC carriers and limiting overspray.
16. **Wineries:** New rule requiring control of VOC emissions during fermentation by condensation, adsorption, etc.
17. **Coatings Manufacturing:** New rule requiring control of VOC emissions from reactors, blenders, mixers, and transfer and storage. Requirements would be similar to existing requirements for pharmaceutical products in Regulation 8 - Rule 24.
18. **Lawnmowers:** New rule banning the sale of two-cycle lawnmowers and limiting hydrocarbon emissions from new four-cycle engines.
19. **Reciprocating Engines (gasoline/gas fuel):** New rule requiring reduction of hydrocarbon emissions from reciprocating engines. Replace two-cycle engines with four-cycle; replace four-cycle engines with electric motors where possible.
20. **Farm Tractors (gasoline fuel):** New rule requiring control of hydrocarbon emissions from new gasoline engine tractors.
21. **Construction Equipment (diesel):** New rule requiring control of hydrocarbon emissions from new and existing equipment.
22. **Vegetable Oil Manufacturing:** New rule requiring control of VOC emissions from extractors, desolventizers, dryers, coolers and conveyors by a mineral oil scrubber and proper maintenance and operation per draft EPA CIG.
23. **Aerospace Assembly and Coating Operations:** Regulation 8 - Rule 29 is being developed, with an independent workshop schedule.
24. **Rubber/Plastic Products Manufacturing:** New rule requiring control of VOC emissions from molding, curing, cementing, etc by condensation, adsorption or incineration.
25. **Pleasure Boats (gasoline and diesel fuel):** New rule requiring hydrocarbon controls on new engines.
26. **Marine Lightering Retrofit:** New rule requiring 90 to 95% control of VOC emissions by vapor balance, condensation, etc.
27. **Off-Road Motorcycles (gasoline two-cycle):** New rule banning the sale of new two-cycle engines in favor of four-cycle.
28. **Industrial Maintenance Coatings:** New rule requiring the use of low solvent coatings for some industrial maintenance applications.
29. **Sanitary Landfill Sites:** New rule requiring the installation of gas collection systems. Gas would be combusted directly or separated into a saleable methane portion and a non-methane portion, to be incinerated.
30. **Marine Vessel Gas-Freeing:** New rule would require gas freeing be conducted outside District waters with exceptions for safety considerations, etc.
31. **Tanker Ballasting:** The Coast Guard has adopted a Rule requiring segregated ballast or a washed ballast tank and an inert gas system for tankers larger than 40,000 DWT.
32. **New Electronics Industry Regulation:** New rule would require control of significant solvent emitting sources by condensation, adsorption, etc.
33. **Coating of Plastics:** New rule would require control of VOC emissions by the use of low-solvent coatings or equivalent control by condensation, adsorption, incineration, etc.
34. **Pleasure Boat Fueling (gasoline):** Modify Regulation 8 - Rule 7 to require control of VOC emissions from pleasure boat fueling with vapor recovery systems.
35. **New Source Review:** Modify the Regulation 2 - Rule 2 to increase the on-site offset ratio for VOC from 1.0:1 to 1.1:1 or 1.2:1 on an annual average basis.
36. **Ozone from Irradiation Beams:** New rule requiring control of directly emitted ozone by scrubbers, etc.
37. **Tree Replacement:** New rule requiring the replacement of 10% of high VOC emitting species with low emitting native species.
38. **Large Commercial Bakeries:** New rule requiring control of oven VOC emissions from large commercial bakeries.
39. **Develop and Tighten Plant Emission Limits:** New rule requiring 10% reduction of current allowable organic emissions for plants emitting more than 100 tons of organics per year.
40. **Airport Fuel Transfer (gasoline):** New rule requiring control of VOC emissions from fuel transfer by the use of vapor balance systems.
41. **New Service Stations:** Modify Regulation 8 - Rule 7 to require the use of secondary assist vapor recovery systems for vehicle fueling at new service stations.
42. **Zero Gap Seals for Floating Roof Tanks:** Modify Regulation 8 - Rule 5 to require installation of "zero gap" seals on most floating roof tanks.

Since 1955, the BAAQMD has enacted regulations to reduce emissions from stationary sources. The present controls are summarized in Section II. Over the years, stationary source controls have become more comprehensive and stringent, and most of the "easy" controls have already been adopted. Thus, it may be expected that the new proposals will have some unattractive aspects, in terms of costs, technical requirements, or administrative difficulties. However, in the absence of feasible alternatives, it appeared necessary to develop additional stationary source controls. Apart from drastic lifestyle changes, only vehicle inspection and stationary source controls offer hope for attaining the ozone standard.

Control Measure Assessment

To make the evaluation and selection process as objective as possible, staff has attempted to specify costs, emissions reductions and photochemical reactivity for each proposed control measure. The measures were then ranked in order of preference based on their projected cost effectiveness. Costs were calculated over a twelve-year period, from 1983 through 1994, to include capital and operating costs. These were discounted back to present value and, finally, equivalent annual cost in 1982 dollars. The effectiveness of a measure can be expressed in two ways, in terms of organic emission reductions (tons/day), or in terms of potential ozone reduction (parts per hundred million). The ozone reduction achievable from each control measure was calculated based on the photochemical sensitivity of a LIRAQ-derived trajectory model which was applied to three important trajectories in the Bay Area. Expense and time considerations preclude the use of the full LIRAQ grid model to evaluate each proposed control measure individually. The trajectory model uses the same photochemical module, however, and provides a valid yet inexpensive substitute for grid model runs.

For the trajectory model evaluation, the expected emission reductions in four organic reactivity classes and the change, if any, in NO_x emissions were used to calculate the ozone reduction potential of each proposed control measure. The proposed stationary source measures were then ranked with respect to their cost-effectiveness. The results of this ranking are shown in Table 21. Some of the measures originally studied are not practical, in staff opinion, because of technical feasibility, jurisdiction, or enforcement problems. Those measures judged not reasonably available were not included in the cost-effectiveness ranking process. These are summarized in Table 22 and Appendix D.

The known sensitivity of the LIRAQ grid model was then used to estimate the total tonnage reduction which is likely to produce attainment of the ozone standard in 1987. This provides a preliminary cutpoint for selection of control measures from the ranked list. The chosen measures were then translated into a new 1987 "Control" inventory for a confirmation run in the LIRAQ grid model. From the results of this confirmation run it may prove necessary to adjust the control strategy to demonstrate attainment with the full LIRAQ model on each prototype day. The cutpoint would be adjusted up or down the list as necessary.

Other impacts of the various control measures are detailed in Table 1. The public and elected officials, in review committees, Boards and Commissions, have the opportunity to consider social, economic, political, energy and other impacts of the proposed measures during the review and adoption processes. Such impacts may be deemed important enough to change the ranking and selection of measures.

Plan Recommendations

A vehicle inspection and maintenance program is expected to reduce hydrocarbon emissions by 41 tons/day by 1987, so the remaining 44 tons/day must be obtained through stationary source control. Reductions due to transportation controls do not affect this accounting because they are accompanied by NOx reductions which cancel any local ozone benefits.*

At their May 26 meeting, the Joint Air Quality Planning and Advisory Committee accepted four changes in the ranking presented by staff. Control measures affecting lawnmowers, off-road motorcycles, wineries, and marine vessel gas-freeing were "down-ranked" to the bottom of the contingency list, which is explained below.

Control Measures Recommended for Implementation. From the list of ranked measures, those which are most effective and least costly are recommended for implementation, up to the targeted tonnage of 44 tons/day. This results in a cutoff line below the measure ranked #22 in Table 21. If this Plan is approved, the first twenty-two measures, down through "Volatile Organic Waste Disposal," will be implemented as new regulations by the BAAQMD. The state Health and Safety Code requires public notice and hearings prior to actual adoption of a regulation, and workshops are usually held to insure an orderly and efficient rule-making process. The actual language development is important because it determines the final cost-effectiveness and enforceability of the regulation.

Control Measures Recommended for Contingency. Based on the Clean Air Act, EPA has developed requirements for contingency planning. Measures in the contingency category will not be needed to attain the ozone standard by 1987 unless something goes wrong. There are circumstances which could make it necessary to review and develop selected contingency measures; some of these are:

- o Inspection/Maintenance program less effective than 41 tons/day;
- o One or more of the twenty recommended measures less effective than present analysis indicates;
- o Delays in adoption of regulations or delays in compliance;
- o Multiple exemptions change reduction estimates;
- o Air monitoring data does not show air quality improvement.

*See discussion of LIRAQ Sensitivity Tests in Section III.

TABLE 21

RANKING OF PROPOSED STATIONARY SOURCE CONTROL MEASURES IN ORDER OF
PREFERENCE BASED ON COST* PER UNIT OZONE REDUCTION

Rank**	Measure	BAAQMD ID No.	Cost* Eff (\$mil/pphm)	HC Red An Avg (t/d)	Cumul HC Red (t/d)	Cumul Ozone Red (pphm)	Cumul Cost* (\$mil)
1.	Tanker Ballasting***	31	.01	2.5	2.5	.06	.00
2.	Reciprocating Engines	19	1.38	4.0	6.5	.27	.29
3.	Gasoline Distribution	11	3.14	1.0	7.5	.32	.47
4.	Pesticides	15	3.88	3.7	11.2	.46	1.01
5.	Wood Furniture Coating	6	4.41	1.1	12.3	.50	1.21
6.	Electronics Industry	32	4.84	5.7	18.0	1.24	4.91
7.	Org Chem Mfgr	1	6.35	.3	18.3	1.25	4.97
8.	Aerospace Assbl & Coating	23	8.76	.5	18.8	1.27	5.15
9.	Aerosol Cans	8	9.83	3.0	21.8	1.33	5.75
10.	Coating of Plastic	33	10.31	2.0	23.8	1.40	6.48
11.	Indust Main Coating	28	12.54	1.0	24.8	1.43	6.85
12.	VOC Storage	13	14.52	3.0	27.8	1.49	7.84
**13.	Large Commercial Bakeries	38	17.40	1.1	28.9	1.52	8.24
**14.	Marine Lightering	9	18.03	.6	29.5	1.53	8.46
15.	Zero Gap Seals FR Tanks	42	19.41	1.5	31.0	1.56	9.12
16.	Polymer & Resin Mfgr	5	23.91	.2	31.2	1.56	9.24
17.	Rubber/Plastic Prod Mfgr	24	24.52	1.1	32.3	1.59	9.88
18.	Coatings Manufacturing	17	24.53	.2	32.5	1.60	10.03
19.	Nat Gas & Crude Oil Prod	4	26.41	1.6	34.1	1.61	10.47
20.	Sanitary Landfill Sites	29	27.03	7.2	41.3	1.95	19.97
21.	Vegetable Oil Mfg.	22	33.15	.4	41.7	1.95	20.12
22.	Volatile Org Waste Disp	7	34.20	6.0	47.7	2.10	25.42
****							****
23.	Automobile Refinishing	14	34.41	5.2	52.9	2.25	30.72
24.	Letter Press/Offset Print	3	37.96	3.0	55.9	2.30	32.72
25.	Architectural Coatings	12	48.65	1.0	56.9	2.31	33.27
26.	Ship Barge Tanker RR Load	10	66.02	3.0	59.9	2.38	38.17
27.	Gen Solv & Surf Coat Oper	2	69.28	1.5	61.4	2.42	41.47
28.	Pleasure Boats	25	84.46	7.0	68.4	2.66	61.47
29.	New Source Review	35	123.88	.2	68.6	2.66	62.05
30.	New Service Stations	41	340.61	.0	68.6	2.66	62.07
**31.	Lawnmowers	18	1.01	.1	68.7	2.66	62.08
**32.	Offroad Motorcycles	27	3.86	.8	69.5	2.69	62.20
**33.	Wineries	16	26.77	.1	69.6	2.69	62.28
**34.	Marine Vessel Gas Free	30	32.76	.1	69.7	2.69	62.31

*Equivalent Annual Cost in 1982 dollars. Capital and operating costs for the period 1983-1994 were discounted to present 1982 values, then converted to annual equivalents. Discount rate was assumed to be 12% per year.

**Rank changes after 5/26/82 version occurred due to: a) Shift of four measures--Lawnmowers, Offroad Motorcycles, Wineries and Marine Vessel Gas Freeing--to "Recommend for Contingency" status per Joint Air Quality Planning Advisory Committee decision. b) Update of cost effectiveness calculations, based on better estimates of distribution of emissions by month and reactivity. Reranking produced significant reordering only for Large Commercial Bakeries and Marine Lightering.

***U.S. Coast Guard requirements; no additional costs due to air pollution control.

****Emission reduction of at least 44 tons per day needed from stationary sources, given regional emission reduction target of 85 tons per day by 1987 and 41 tons per day from an Inspection and Maintenance program.

If it does become necessary to obtain further reductions from stationary sources, a process has been defined to re-evaluate and implement some of the measures now in the contingency category. This process is set forth in Section VII of this Plan. Presently the measures ranked 21 through 34 in Table 21 are considered to be in the contingency category. Measures 21-30 appear in the contingency group simply because the analysis showed that they were lower in the cost-effectiveness ranking. Measures ranked 31-34 appeared to be reasonably cost effective, on a \$ per unit ozone reduction basis, but they carried high administrative costs or enforcement difficulties, together with small absolute air quality improvements. On a practical basis, these appear to be the least attractive of the ranked measures. They were moved into the contingency group as measures of last resort.

Control Measures Considered Not Reasonably Available. As mentioned above, some of the proposed measures were judged to be not reasonably available--for technical, legal, or administrative reasons. These measures, listed in Table 22 and Appendix D, are effectively dropped from further considerations, although they might be resurrected in some dire circumstance, such as the failure of the State Legislature to enact any I/M program whatsoever.

TRANSPORTATION CONTROL MEASURES

Alternative Control Measures

MTC began the analysis of potential transportation controls with an assessment of the transportation control categories contained in Section 108(f) of the Clean Air Act. Details on this assessment can be found in Appendix B. A brief summary is presented in Table 23.

Assessment and Selection

The results of the preliminary analysis were presented to the Joint Air Quality Planning and Advisory Committee in January. In general, the TCMs were found to be ineffective for a number of reasons:

- o The vehicle fleet will be much cleaner by 1987. Cars and light-duty trucks emitted 286 tons/day of HC in 1979. By 1987 this is expected to decrease to 153 tons/day. After accounting for the I/M credits and the daily evaporative emissions (which occur whether or not the car is driven), the amount subject to control is approximately 95 tons. Thus, even if travel were reduced by 10%, HC would be reduced by only 9.5 tons.

TABLE 22. STATIONARY SOURCE CONTROL MEASURES CONSIDERED NOT
REASONABLY AVAILABLE

The following measures were considered in the development of control alternatives, but are not recommended. As described below, these measures are not considered to be reasonably available for attainment of the federal ozone and/or carbon monoxide standards.

Lawnmowers--Ban use of gasoline-powered lawnmowers on high ozone days--Difficult to enforce; could be voluntary. (BAAQMD Control Measure No. 18-B.)

Farm Tractors--Require (hardware) controls on new gasoline tractors--would require ARB to set statewide emissions limits; manufacturers would have to redesign specifically for California market; problems with state law which prohibits control on "implement of husbandry;" difficult to enforce because no registration/licensing system. (BAAQMD Control Measure No. 20.)

Diesel Construction Equipment--Require periodic adjustment to manufacturer's specification--Operators do frequent field maintenance and adjustments for good performance (not lowest emissions); difficult to enforce because no registration system and frequent moves to different job sites, even across state lines. (BAAQMD Control Measure No. 21.)

Pleasure Boats--Ban use of 2-cycle engines on high ozone days--Difficult to enforce. (BAAQMD Control Measure No. 25-B.)

Pleasure Boats--Ban use of all internal combustion engines on high ozone days--Difficult to enforce. (BAAQMD Control Measure No. 25-C.)

Marine Lightering Retrofit--Modify vessels for vapor balance, or equivalent, to achieve 90% control--Difficult to achieve unless statewide or nationwide requirement, or dedicated fleet; safety considerations and Coast Guard jurisdiction; problems with state law. (BAAQMD Control Measure No. 26.)

Off-road Motorcycles--Ban use of off-road motorcycles on high ozone days--Difficult to enforce; could be voluntary. (BAAQMD Control Measure No. 27 B.)

Pleasure Boat Refueling--Require vapor recovery at marinas--Not technically feasible; high cost and low potential for ozone reduction. (BAAQMD Control Measure No. 34.)

Tree Replacement--Require replacement of 10% of trees on public lands in central Bay Area--Politically unpopular; costs and secondary effects unknown. (BAAQMD Control Measure No. 37.)

Plant Emission Limits--Reduce emissions from large stationary sources by 10% below present baseline--Arbitrary reduction of 10% may not be achievable; could be most expensive. (BAAQMD Control Measure No. 39.)

Airport Fuel Transfer--Require vapor recovery at airports for gasoline transfer to trucks and planes--Small emission reduction potential; technical difficulties; safety problems and FAA jurisdiction. (BAAQMD Control Measure No. 40.)

TABLE 23. Assessment of Clean Air Act Section 108(f) Transportation Measures 1

Section 108(f) Category	Potential Effectiveness ²	Section 108(f) Category	Potential Effectiveness
(i) motor vehicle emission inspection and maintenance programs;	Not analyzed as a TCM. Included in Section IV-A of Plan.	(x) provisions for employer participation in programs to encourage carpooling, vanpooling, mass transit, bicycling, and walking;	Programs already in place. Additional efforts could yield reductions of 0.2 tons of HC, 2.1 tons of CO, and 0.2 tons of NO _x .
(ii) programs to control vapor emissions from fuel transfer and storage operations and operations using solvents;	Not analyzed as a TCM. Included under BAAQMD stationary source controls (Section IV-B).	(xi) programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;	Bicycling program could reduce HC by 0.6 tons/day, CO by 7.7 tons/day, and NO _x by 0.1 tons/day.
(iii) programs for improved public transit;	Reductions ranged up to 1.0 tons/day of HC, 10.5 tons/day of CO, and 1.0 tons/day of NO _x .	(xii) programs of staggered hours of work;	HC: 0.6 tons, CO: 7.1 tons, NO _x : 0.5 tons
(iv) programs to establish exclusive bus and carpool lanes and areawide carpool programs;	Depends on specific HOV project. Additional carpool matching programs could achieve reductions of 0.1 tons/day of HC, 1.2 tons/day of CO, and 0.1 tons/day of NO _x .	(xiii) programs to institute road user charges, tolls, or differential rates to discourage single occupancy automobile trips;	Reductions up to 0.3 tons/day of HC, 3.5 tons/day of CO, and 0.4 tons/day of NO _x .
(v) programs to limit portions of road surfaces or certain sections of the metropolitan areas to the use of common carriers, both as to time and place;	HC: less than 0.1 tons, CO: 0.2 tons, NO _x : less than 0.1 tons.	(xiv) programs to control extended idling of vehicles;	If 1000 delivery vehicles are controlled, reductions would be less than 0.1 tons/day of HC and NO _x , and 0.2 tons/day of CO.
(vi) programs for long-range transit improvements involving new transportation policies and transportation facilities or major changes in existing facilities;	No impacts by 1987.	(xv) programs to reduce emissions by improvements in traffic flow;	Short-term impacts similar to category (vii). Over the long-term increased traffic would probably negate any benefits.
(vii) programs to control on-street parking;	Short-term impacts could range up to 0.4 tons/day reduction of HC, 1.3 tons/day reduction of CO, and a 0.1 tons/day increase in NO _x . Over the long-term traffic increases would probably negate any reductions.	(xvi) programs for the conversion of fleet vehicles to cleaner engines or fuels, or to otherwise control fleet vehicle operations;	Converting 1000 vehicles to propane would yield reductions of less than 0.1 tons/day of HC and NO _x , and 0.2 tons/day of CO. Replacing 1000 vehicles with electric vehicles would reduce HC and NO _x by less than 0.1 tons/day, and CO by 0.2 tons/day.
(viii) programs to construct new parking facilities and operate existing parking facilities for the purpose of park and ride lots and fringe parking;	Programs already in place. Additional efforts would reduce HC by less than 0.1 tons/day, CO by 0.7 tons/day, and NO _x by less than 0.1 tons/day.	(xvii) programs for retrofit of emission devices or controls on vehicles and engines, other than to light duty vehicles, not subject to regulations under section 202 of title II of this Act;	Not analyzed as a TCM. ARB, which has responsibility for this measure, has rejected it.
(ix) programs to limit portions of road surfaces or certain sections of metropolitan area to the use of nonmotorized vehicles or pedestrian use, both as to time and place;	Reductions from a single auto free zone would be less than 0.1 tons/day of HC and NO _x , and 0.01 tons/day of CO.	(xviii) programs to reduce motor vehicle emissions which are caused by extreme cold start conditions.	Not applicable to the Bay Area because of the moderate climate.

1. Review of the Section 108(f) revenues is mandated by the Clean Air Act Amendments of 1977.

2. Because estimated amounts are extremely small, errors in estimation could easily be larger than amounts shown.

- o TCMs have only minor impacts on travel. An individual's travel decisions are strongly influenced by the density and types of land uses in a region; thus, it is difficult to influence travel decisions thru TCMs. As an example, the gas price increase in 1979 was quite significant, but resulted in only minor travel reductions.
- o Bay Area citizens currently use alternative travel modes to a large extent. For example, the Bay Area has the third highest percentage of commuters on transit in the nation. Because of this, the additional diversions that can be expected from many of the TCMs are fairly small.
- o TCMs reduce hydrocarbons and oxides of nitrogen simultaneously, and so have virtually no impact on ozone levels.

Plan Recommendations

These results reinforce the findings in the 1979 Air Quality Plan. In that Plan, because TCMs were not found to be effective, MTC adopted the following guidelines:

MTC policy supports measures that improve or enhance alternatives to the automobile without penalizing those dependent on the auto. These alternatives include transit, carpooling, and bicycle systems.

MTC also adopted a specific guideline on pricing alternatives:

Because the impact of specific pricing control measures appears quite small, MTC will consider such control measures only under certain conditions:

1. when problems of social and economic inequities in the transportation system are minimized and adequate transportation alternatives exist;
2. when such pricing measures are necessary to ensure that the transportation plan is feasible;
3. when such a measure is evaluated in detail and subjected to full-scale public hearings.

The current analysis reaffirms these guidelines. Accordingly, a set of 15 TCMs which have a variety of benefits in addition to their emissions benefits is proposed. The recommended measures are shown in Table 24. Further details are provided in Appendix B. In total, these 15 measures would reduce HC by 2 tons/day, CO by 26 tons/day, and NO_x by 2 tons/day. Measures considered not reasonably available include the following:

TABLE 24. Recommended Transportation Controls

Proposal	Pollutant Reductions ¹		Energy Impacts gals/gas saved per day
	HC	CO	
Reaffirm commitment to 28% ridership increase between 1978 through 1983.	Already Included in Baseline		---
Support post-1983 improvements identified in operator's 5-year plans, after consultation with the operators adopt ridership increase target for 1983-87.	0.6	7.3 1.0	31,600
Seek to expand improve public transit beyond committed levels.	0.3	3.8 0.5	16,300
Continue to support development of HOV lanes. (Emission credit would not be allowed for specific projects until environmental studies were completed and funds were programmed.)	Depends on specific project		---
Continue to support RIDES efforts.	Already Included in Baseline		---
Continue efforts to obtain funding to support long-range transit improvements.	No Effect by 1987		---
Reaffirm commitment to preferential parking programs.	Already Included in Baseline		---
1. Because estimated amounts are extremely small, errors in estimation could easily be larger than amounts shown.			

Proposal	Pollutant Reductions		Energy Impacts gals/gas saved per day
	HC	CO	
Encourage transit operators to work with Caltrans to identify under-utilized lots.	0.1	0.5 0.1	1,900
Continue present Commute Alternative Program.	0.1	0.9 0.1	3,500
Encourage cities to change zoning regulations to decrease parking requirements for employers who encourage car/vanpooling.	0.1	1.5 0.2	7,000
Complete the bicycle element of the MTC Regional Transportation Plan.	0.4	5.4 0.1	3,300
Continue MTC Commute Alternatives Program and place additional emphasis on flextime program.	0.4	5.0 0.3	14,400
Encourage cities to use CEQA-enforcement procedures to restrict the development of commercial drive-through facilities.	0.1	1.3 <0.1	1,000
Encourage large delivery fleet operators to restrict vehicle idling either through company policy or the use of vehicle controls.	<.01	0.1 <0.1	100
Disseminate information on the economic and technical benefits of alternative engines and fuels to fleet operators in the Bay Area.	<0.1	0.1 <0.1	1,100

1. Significantly increase bridge tolls (HC: -0.1 tons, CO: -0.8 tons, NO_x: -0.1 tons, assuming tolls increased by 30%)
2. Increased parking rates (HC: -0.2 tons, CO: -2.4 tons, NO_x: -0.4 tons, assuming parking rates increased by 50%)
3. Restrict parking on major streets in the morning and afternoon peaks (HC: -0.3 tons, CO: -0.9 tons, NO_x: +0.1 tons. These are short-term impacts. Over the long term, the improved traffic flow may ultimately encourage more traffic.)
4. Substitute electric vehicles for conventionally powered vehicles (HC: -1.5 tons, CO: -11.5 tons, NO_x: -1.0 tons, assuming 100,000 electric vehicles.)
5. Impose gas rationing (HC: -29.9 tons, CO: -357.1 tons, NO_x: -45.7 tons, assuming supply reduced by 25%.)

Contingency Plan

EPA guidelines require a contingency plan for transportation measures which will be implemented if reasonable further progress is not achieved. This contingency plan contains two elements:

- a) List of transportation projects with potentially adverse air quality impacts which will be delayed while the air quality plan is being revised.

MTC believes that providing a list of specific projects in this plan is impractical for two reasons:

- o the project list would change depending on the year that the RFP target is not met;
- o the environmental documentation on projects in the later years of the Transportation Improvement Program (TIP) is not yet available in most cases.

Accordingly, if the RFP target is not met, MTC may delay certain categories of projects in the TIP if they are shown to have significant adverse impacts on air quality. The criteria for delaying projects and specific projects to be delayed will be determined following the initial public hearing described below. The categories which may be delayed include:

- o Freeway Congestion Relief Projects (HB 42)*

*Designation refers to CalTrans category.

- o Freeway Traffic Service Projects (HB 43)
 - o Conventional Highway and Expressway Operational Improvement Projects (HB 44)
 - o New Connections and Cross-Traffic Improvements (HE 11)
 - o Upgraded Facilities (HE 12)
 - o Lane Additions (HE 13)
 - o New Highways (HE 14)
 - o Projects funded by the Federal Aid Urban Program which increase roadway capacity.
- b) Process for determining/implementing additional TCMs.

If a determination is made that the RFP target is not being met, within 6 months MTC will:

- o hold an initial public hearing to solicit comments on highway projects to be delayed and suggestions on additional controls;
- o review progress made in implementing controls adopted in the Air Quality Plan;
- o analyze additional controls;
- o hold a final public hearing prior to adoption of additional measures.

Basic Transportation Needs

The Clean Air Act Amendments of 1977 require that non-attainment regions institute comprehensive public transportation measures to meet basic transportation needs. The Bay Area currently has an extensive transit network which fulfills this criterion. This includes 21 scheduled public transit carriers, 31 publicly subsidized accessible van services, and 25 publicly subsidized accessible taxi services. Together these ensure that Bay Area citizens, including the elderly and handicapped, are able to travel without depending on private automobiles.

The operating budgets of the ten major transit carriers, along with the federal, state, and local operating subsidies for each, are shown on pages 4-27 through 4-36 of the 1981-82 Transportation Improvement Program for the Nine County San Francisco Bay Area. These budgets were adopted by the transit operators and MTC has committed to the subsidies for which it has responsibility.

ADMINISTRATIVE PROGRAMS FOR LONG-TERM MAINTENANCE

Two administrative programs that would enhance the ability of the region to maintain improved air quality over the long term are recommended for the plan--these programs are Advisory Review of Local Projects and Plans, and Conformity Assessment of Federally Supported Activities.

Advisory Review of Projects and Plans

This program is directed toward new or modified facilities, both public and private, and plans that could result in significant impacts on air quality. Such facilities would include major shopping centers, office developments, large housing developments, highways, airports, parking structures and entertainment complexes. While they are not direct air pollution sources themselves, they do attract large volumes of vehicle traffic which can lead to air quality problems. Such review systems are currently in effect on a mandatory basis at Lake Tahoe and other areas in the nation.

The Advisory Review system proposed here would be, as the name implies, advisory in nature. It would be conducted administratively as part of Plan and Project Review functions and would use the existing California Environmental Quality Act environmental document process as the primary vehicle for receiving information and communicating comments. The three co-lead air quality planning agencies (ABAG, MTC, BAAQMD) would cooperate in developing comments on specific projects, and would work with cities, counties and project sponsors to minimize adverse air quality impacts. Special relationships would be established with local jurisdictions in known or suspected CO exceedance areas (i.e., San Jose and other cities in Santa Clara County, and Oakland) to ensure that relevant plans and project proposals with potentially significant impacts are reviewed as early in their planning stages as possible. The air quality benefits of this measure are at present unquantifiable--it is recommended for incorporation into the 1982 Plan to help ensure long-term maintenance of federal standards in the Bay Area.

Conformity Assessment of Federally-Supported Activities

This program is intended to implement the provisions of Section 176(c) and Section 316 of the Clean Air Act. Section 176(c) provides that:

"(c) No department, agency, or instrumentality of the Federal Government shall (1) engage in, (2) support in any way or provide financial assistance for, (3) license or permit, or (4) approve, any activity which does not conform to a plan after it has been approved or promulgated under section 110. No metropolitan planning organization designated under section 134 of title 23, United States Code, shall give its approval to any project, program, or plan which does not conform to a plan approved or promulgated under section 110. The assurance of conformity to such a plan shall be an affirmative responsibility of the head of such department, agency, or instrumentality."

Section 316 permits EPA to withhold, condition or restrict sewage treatment grants under Section 201 of the Clean Water Act if an area:

"does not have in effect, or is not carrying out, a State implementation plan approved by the Administrator which expressly quantifies and provides for the increase in emissions of each air pollutant...which increase may reasonably be anticipated to result directly or indirectly from the new sewage treatment capacity which would be created by such construction."

The section further permits grant restrictions if:

"...the construction of such treatment works would create new sewage treatment capacity which--...may reasonably be anticipated to cause or contribute to, directly or indirectly, an increase in emissions of any air pollutant in excess of the increase provided for under the provisions...[of] the applicable implementation plan...."

The proposed program would be conducted as part of ABAG's Plan and Project Review function. As the areawide clearinghouse for all federal grant applications (under requirements of the Federal Intergovernmental Cooperation Act and the Federal Demonstration Cities and Metropolitan Development Act), ABAG's Executive Board comments on federal grant applications for conformity with adopted regional policies, including provisions of the air and water quality management plan. Hence conformity assessment under the two sections cited above can be easily conducted using ABAG's existing Plan and Project Review function--sometimes referred to as the A-95 process after Office of Management and Budget Circular A-95. The other co-lead agencies (MTC and the BAAQMD) regularly participate on the staff-level review team, and, as proposed, would continue to do so. This could be formalized through an amendment to the existing Memorandum of Understanding between the three agencies regarding air quality planning.

ADDITIONAL PROGRAMS PROPOSED BY THE JOINT AIR QUALITY PLANNING AND ADVISORY COMMITTEE (JAQPAC) FOR CONSIDERATION IN THE PLAN

Four additional programs were approved by the JAQPAC for consideration in the draft plan. Due to their controversial nature, they are described separately from the other measures. (More extensive descriptions appear in Appendix C.) The four programs are as follows:

Land Use Measures: Otherwise known as "Compact growth", this program was proposed as part of the draft Environmental Management Plan for the Bay Area, and was rejected by most of the regional and local policy boards evaluating the draft plan. This measure was estimated to result in 24 tons/day of hydrocarbon emission reductions by the year 2000, with little impact expected by 1987. Compact growth is to some degree already occurring in the Bay Area due to limited land availability, high housing costs and other factors.

Mandatory Indirect Source Review: This mandatory review process would replace "Advisory Review of Projects and Plans" for indirect sources above specified size criteria. A new category of Authority to Construct permits would be issued to applicant-developers by the BAAQMD. As an alternative mechanism, each city and county in the District could amend its building permit regulations to include air quality requirements according to uniform standards. In the latter case, the local applications would be reviewed by BAAQMD or by the three co-lead air quality planning agencies. Comments on the permits would then be forwarded to the cities and counties for their final permit actions.

Public Support for Transit: The Bay Area, like other regions across the nation, requires large public subsidies to fund their transit operations. In fiscal year 1980-81, federal assistance of \$41 million covered 9% of the costs of this region's transit operations. The current Administration plans to phase out transit operation assistance by 1985. Transit operators are trying to maintain services by cutting costs through productivity improvements and raising fares. The Administration is also seeking to eliminate funds for transit expansion. However, the ability of transit districts to obtain additional nonfederal revenues to replace the federal costs is severely limited. MTC recommends that, rather than cutting out Federal subsidies altogether, Congress should adopt a new formula for distributing the monies that is largely based on service factors.

Additional Transportation Measures Suggested by the California Air Resources Board: The California Air Resources Board staff have recommended that a number of measures that have been implemented in various cities should be considered for implementation as part of the 1982 Bay Area Air Quality Plan. These measures include:

- o Trip reduction ordinances requiring employees and/or business property landlords to promote transit use, ridesharing participation and use of other alternative travel modes among employees;
- o Computerized telephone information systems for transit which provides bus arrival times at the caller-specified bus stop to reduce uncertainty and wait time (and thereby promote transit ridership);
- o Bicycle facilities ordinances to encourage the use of bicycles as an alternative to the automobile;
- o Management of parking supply and parking requirements in local zoning ordinances to provide preferential parking for carpools and reduce parking availability for specified target groups such as commuters;

- o Driver training program to promote trips management and vehicle maintenance practices;
- o A variety of voluntary programs such as flextime, employer bus fare subsidy program and private education programs to encourage the public to drive less.

In addition, a number of programs were identified that are either already being implemented in the Bay Area or are already proposed as part of this plan. The ARB-recommended measures are described in more detail in Appendix C.

IMPLEMENTATION SCHEDULE

The control programs recommended for implementation would be phased in during the period from 1983 to 1987, beginning with the most effective programs. Approximate dates for the Stationary Source programs are indicated in Table 25. Table 26 and Figure 17 illustrate the overall year-by-year progress that is expected for hydrocarbon emission reductions with both existing and proposed control programs. Figure 18 presents the results of the LIRAQ assessment of the proposed control strategy, confirming attainment of the ozone standard. The schedule of implementation milestones for the recommended transportation controls is summarized for each measure as follows:

1. **Reaffirm commitment to 28% transit ridership increase between 1978 and 1983.**
 - o MTC reaffirms measure in 1982 Air Quality Plan.
 - o Measure is currently being implemented by operators. A 25.6% increase in ridership has been recorded over the first 3 years of this period.
 - o MTC assesses effectiveness of increase in annual RFP reports.
2. **Support post-1983 improvements identified in operator's 5-year plans, after consultation with the operators adopt ridership increase target for 1983-1987.**
 - o 6 major transit operators adopt FY 1983-87 plans by July, 1982.
 - o MTC consults with operators on ridership targets by August, 1982.
 - o MTC, through implementation of the TIP and allocation of regional funds, seeks to ensure operators' 5-year plans are implemented.

TABLE 25. TENTATIVE SCHEDULE FOR IMPLEMENTATION OF STATIONARY
SOURCE CONTROL MEASURES

ID #	C/E*	MEASURE RANKED BY O ₃ RED.	DRAFT REGULATION WRITTEN	REGULATION ADOPTED	IMPLEMENT
32	6	Electronics Industry	82	82	83
29	20	Sanitary Landfill Sites	82	83	83
19	2	Reciprocating Engines	85	85	86
7	22	Volatile Org. Waste Disp.	82	83	85
15	4	Pesticides	84	85	86
33	10	Coating of Plastics	83	84	85
13	12	V.O.C. Storage	83	84	85
8	9	Aerosol Cans	85	85	86
11	3	Gasoline Distribution	82	83	84
6	5	Wood Furniture Coating	82	83	84
28	11	Indust. Maint. Coating	83	84	85
38	13	Large Coml. Bakeries	84	85	86
42	15	Zero Gap Seals Fr. Tanks	83	84	85
24	17	Rubber/Plastic Prod. Mfg.	83	84	85
23	8	Aerospace Assbl. & Coating	82	82	83
1	7	Org. Chem. Mfgr.	82	83	84
9	14	Marine Lightering	84	85	86
17	18	Coatings Mfgr.	83	84	85
4	19	Nat. Gas & Crude Oil Prod.	82	83	84
5	16	Polymer & Resin Mfgr.	83	84	85
22	21	Vegetable Oil Mfgr.	83	84	85
31	1	Tanker Ballasting (U.S. Coast Guard)	--	--	--

*indicates ranking based on cost-effectiveness

TABLE 26. ANNUAL HYDROCARBON EMISSION REDUCTIONS FROM
RECOMMENDED CONTROL PROGRAMS (TONS PER DAY)

YEAR	1979	1980	1981	1982	1983	1984	1985	1986	1987
Baseline hydrocarbon emissions with existing control programs under 1979 Plan (not including biogenic)	732	690	652	615	582	560	545	530	515
Emission <u>reductions</u> from motor vehicle <u>inspection</u> and maintenance	--	--	--	--	--	13	24	33	41
Emission <u>reductions</u> from 22 stationary source measures	--	--	--	--	9.2	17.9	27.6	41.5	47.7
Emission <u>reductions</u> from 15 transportation measures	--	--	--	--	0.3	0.9	1.4	1.8	2.2
Hydrocarbon emissions with the 1982 Plan implemented (not including biogenics)	732	690	652	615	573	528	492	454	424

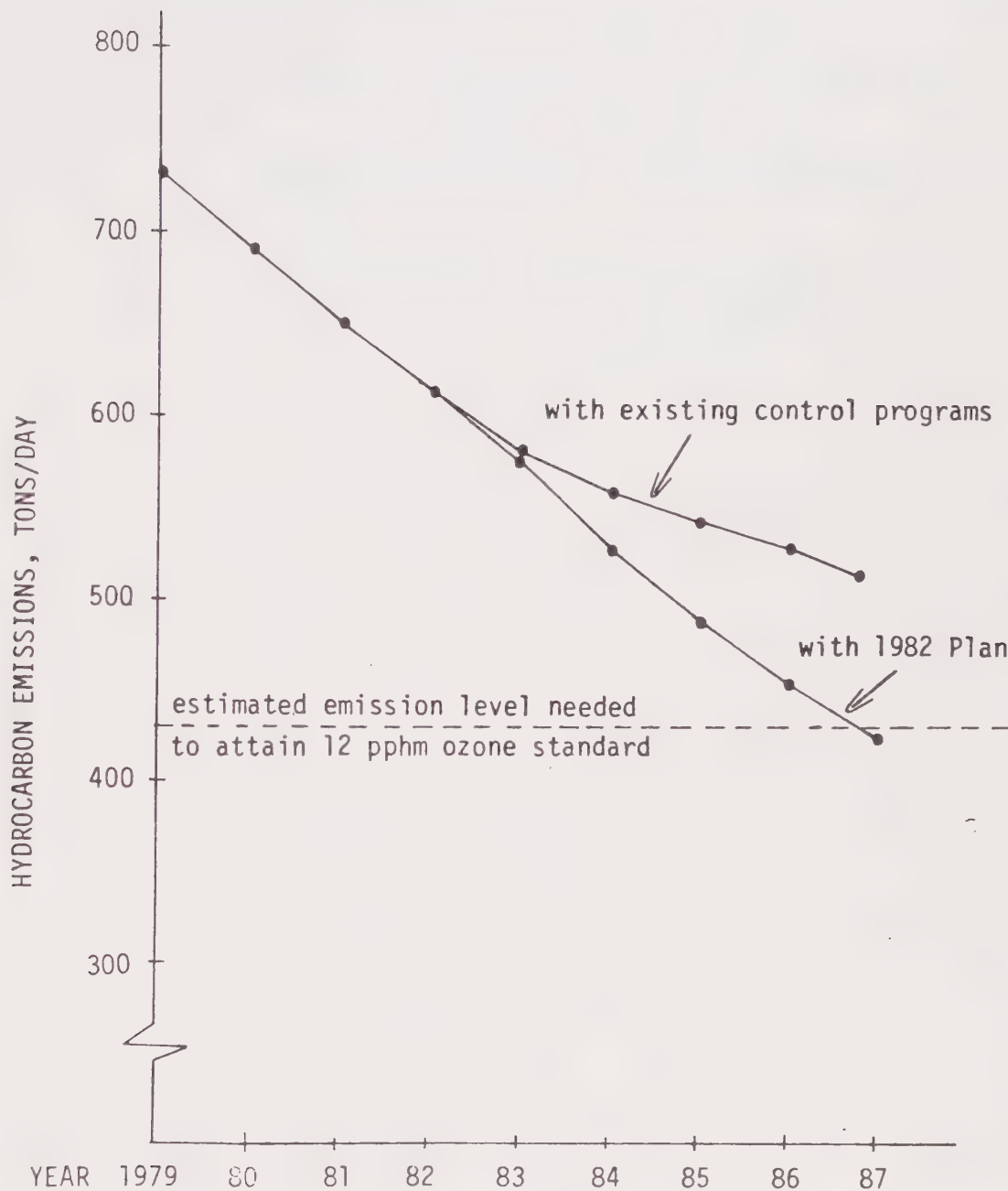


Figure 17. Schedule of Hydrocarbon Emission Reduction Proposed to Achieve the Federal Ozone Standard in the San Francisco Bay Area

- o Ridership gains are monitored through annual RFP reports.
3. **Seek to expand and improve public transit beyond committed levels.**
- o MTC seeks sources of new revenue--ongoing effort.
 - o If funding exists, additional projects and service programmed in FY 84-88 Transportation Improvement Program (July, 1983).
4. **Continue to support development of HOV lanes. (Emission credit would not be allowed for specific projects until environmental studies were completed and funds were programmed.)**
- o MTC will continue to support HOV lanes where justified on a case-by-case basis.
 - o I-580 through Dublin Canyon - EIS to be completed Fall, 1982, project implementation by 1987.
 - o I-580 from Rte. 24 to Bay Bridge - EIS to be completed Fall, 1983, project implementation by 1987.
 - o Rte. 101 in Marin (Stage 2) - Negative Declaration under review, project implementation by 1986.
 - o I-80 - EIS to be completed September, 1983, project implementation unknown.
 - o Rte. 237 from Lawrence Expressway to Rte. 17 - environmental documentation under review, construction by 1984-85.
5. **Continue to support RIDES efforts.**
- o MTC reaffirms measure in 1982 Air Quality Plan.
 - o Measure is currently being implemented. RIDES adopts budget to continue program in July of each year.
 - o Effectiveness of measure assessed in annual RFP reports.
6. **Continue efforts to obtain funding to support long-range transit improvements.**

Assuming funding for new rail starts:

- o Guadalupe - engineering design to be completed Fall, 1983
 - construction anticipated to be completed by 1986
- o BART extensions to North Concord and Warm Springs
 - design begins in FY 82-83
- 7. Reaffirm commitment to preferential parking program**
 - o MTC reaffirms measure in 1982 Air Quality Plan.
 - o Caltrans to open 6 lots in FY 1982-83, 3 in FY 1983-84, and 8 in FY 1984-85.
 - o Assess effectiveness of measure in annual RFP reports.
- 8. Encourage transit operators to work with Caltrans to identify under-utilized lots along major transit lines which could be used as park-and-ride lots.**
 - o Continue the ongoing program which will establish 14 new joint use parking lots per year.
 - o Assess effectiveness in annual RFP reports.
- 9. Continue present Commute Alternatives Program.**
 - o Train 30 commute coordinators each year for the years 1983 through 1987.
- 10. Encourage cities to change regulations to decrease parking requirements for employers who encourage car/vanpooling.**
 - o Conduct a survey of municipal parking ordinances by August, 1982.
 - o Provide information on potential parking ordinances to local cities in 1983-1984.
- 11. Complete the bicycle element of the MTC Regional Transportation Plan.**
 - o Adoption of bike plan into RTP - September 1982.

- o Implementation of bike plan through MTC staff administration of TDA Article 3, review of parking ordinances, encouragement of legislation, etc., September 1982-September 1984.
- 12. **Continue MTC Commute Alternatives Program and place additional emphasis on flextime program.**
 - o Conduct 2 Commute Coordinator training session per year. An average of 15 coordinators are trained in each course.
- 13. **Encourage cities to use CEQA review procedures to restrict the development of commercial drive-through facilities.**
 - o Contact the cities in the Region with populations over 50,000 by the end of 1984 and explain the use of CEQA review for limiting drive-through facilities.
- 14. **Encourage large delivery fleet operators to restrict vehicle idling either through company policy or the use of vehicle controls.**
 - o Contact selected city and county vehicle maintenance personnel. January - June 1983.
 - o Contact state and federal vehicle maintenance personnel. July-December 1983.
 - o Contact corporate vehicle purchasing and maintenance personnel. January-June 1984.
- 15. **Disseminate information on the economic and technical benefits of alternative engines and fuels to fleet operators in the Bay Area.**
 - o Prepare information articles to be included in Transactions - December 1982.
 - o Contact federal, state, county, and city vehicle purchasing and maintenance personnel - January-December 1983.
 - o Contact corporate vehicle purchasing and maintenance personnel - January-June 1984.

SECTION V

CARBON MONOXIDE CONTROL STRATEGY DEVELOPMENT

ALTERNATIVE CONTROL MEASURES

The most appropriate types of measures for reducing carbon monoxide emissions are motor vehicle emissions controls and transportation controls. Another set of controls is concerned with land use and applies to projects and development patterns that might result in significant adverse impacts on air quality. The alternative categories of controls are described below.

Motor Vehicle Emissions Controls

Carbon monoxide emissions occur primarily during engine start-up and while the vehicle is in operation. The emission rate varies substantially with speed, being greatest when the vehicle is idling or operating at low speeds such as those occurring under congested, stop-and-go traffic conditions. The catalyst technology in use on post-1974 model year automobiles is most effective in reducing exhaust emissions. As the number of vehicles with catalyst systems increases, the average vehicle emissions will decrease.

The Air Resources Board currently has regulations that control emissions from light-, medium-, and heavy-duty gasoline powered vehicles, diesel powered trucks and buses, and motorcycles. In addition, the ARB has in effect various regulations and procedures to ensure that emission standards are met.

Examples of additional motor vehicle emissions control programs are:

- o More stringent new vehicle emission standards
- o Exhaust retrofit for heavy-duty gasoline vehicles
- o Mandatory vehicle inspection and maintenance program
- o More stringent certification of compliance procedures
- o More comprehensive new motor vehicle surveillance program
- o Emission standards for other mobile sources

Vehicular emission control is only practical on a regional or statewide basis, and would be effective in reducing emissions for the entire area. A mandatory annual inspection and maintenance program is being proposed as part of the ozone control strategy.

Transportation Controls

Transportation controls for reducing ambient carbon monoxide levels are designed to reduce travel or to relieve congestion (thus raising vehicle speeds). On the other hand, improving traffic flow on roadways already experiencing acceptable levels of service does not necessarily benefit air quality--the improvement may serve to attract more traffic.

Section 108(f) of the 1977 Clean Air Act Amendments lists 18 categories of Reasonably Available Control Measures. These measures are described in Section IV. As part of the EPA requirements for developing the Nonattainment Plan, each of the 18 measures must be reviewed, and if any measure is not included in the control strategy, the technical, economic, or institutional reasons for exclusion must be explicitly stated. Such a review of reasonably available transportation control measures was the basis for developing the carbon monoxide control strategy for San Jose. For carbon monoxide hot spot problems, only those controls over which the city or county has jurisdiction for implementation were considered in the strategy.

Land Use Measures

Land use measures are designed to reduce the number and length of automobile trips. Three candidate land use measures are identified for the carbon monoxide control strategy. Two of them--Advisory Review of Projects and Plans and Conformity Assessment of Federally Supported Activities--apply to specific projects. A third, Compact Growth, is actually a coordinated set of land use policies and actions.

Advisory Review of Projects and Plans - This measure is analogous to new source review for stationary sources, but is aimed at traffic-generating projects such as shopping centers, parking structures, and office buildings. The review would be performed prior to construction to assess air quality impacts. Mitigation measures would be proposed if problems were identified. The advisory nature of this measure means that mitigation is not mandatory. Another version of this measure is mandatory review where mitigation measures are required to be adopted in order for a permit for construction to be issued. Advisory Review for carbon monoxide problems should be adopted and enforced at the local, city level (versus the state or regional levels) for two reasons: first, the CO problem is sub-regional in scale; and second, familiarity with the land use and economic plans of the affected city would result in a more balanced review.

Conformity Assessment of Federally Supported Activities - This measure is intended to implement the provisions of Section 176(c) and Section 316 of the Clean Air Act. Section 176(c) requires that federal funding or approval be denied to any activity which does not conform to the 1982 Plan. Also, no metropolitan planning organization can approve any activity which does not conform to the 1982 Plan. Section 316 permits EPA to withhold, condition or restrict sewage treatment grants if an area does not implement an EPA-approved State Implementation Plan. The measure would be implemented at the regional level with participation by such agencies as ABAG, BAAQMD and MTC.

Compact Growth - Compact Growth is a program of land use policies that promote infill development, higher densities and reduction of urban sprawl, to name a few. The objective is to reduce auto dependency by maximizing utilization of existing transit networks. This measure was proposed as part of the draft Environmental Management Plan for the Bay Area in 1979 and was rejected by most regional and local policy review boards. Some of the policies are occurring as a consequence of the current economic environment, and some are already being carried out by local jurisdictions.

Limit Retail/Commercial Development Growth in the Central Business District (CBD) - Carbon monoxide problems typically occur at congested intersections within the CBD. A limit on development growth would prevent the concomitant growth in vehicular emissions that leads to a deterioration of urban air quality.

CONTROL STRATEGY DEVELOPMENT

Since the implementation of transportation control measures would be the responsibility of the city (or county), a key aspect of carbon monoxide control strategy development was the involvement of the affected cities' traffic engineering, planning and public works departments and the public transit districts. In San Jose, where the CO problem of the three cities is most severe, an arrangement was formalized whereby the City provided baseline traffic data, drew up a list of candidate mitigation measures and assessed the economic, financial and institutional impacts of each of the measures. For Oakland, a traffic consultant recommended by the City provided the necessary traffic data. Since Vallejo is so close to the standard and since traffic is not expected to grow dramatically, it was projected that the standard would be obtained by 1987 as a result of the current vehicle emission standard program. Therefore, traffic data for Vallejo was not required.

Following are descriptions of candidate measures considered for control strategy development in each city, and the criteria for their selection.

San Jose

Twelve candidate transportation mitigation measures were selected for San Jose on the basis of one or more of the following criteria: transit accessibility, traffic circulation, compability with parking management policies, pedestrian and bicycle mobility, compatibility with downtown development plans, environmental quality, costs and financial feasibility, community acceptibility and beneficial economic impacts on the downtown area. Table 27 is a comparison of the twelve candidate measures with the Clean Air Act Section 108(f) measures. A brief description of each measure and the specific criteria used in its selection are described below:

- (1) Transit Mall - The 1978 Downtown San Jose Transit Mobility Study recommended a county-wide transit system capable of carrying a major share of the county commuters. The system could be efficiently integrated with regional transportation, and would enhance the revitalization of the downtown area. A key element in the integrated system would be the implementation of a transit mall in downtown San Jose. (See Figure 15.) The Transit Mall would have beneficial impacts on: transit service, auto and truck circulation, downtown parking management, pedestrian mobility, downtown development plans, environmental quality (county-wide air quality improvements) and reduced fuel consumption.

TABLE 27. COMPARISON OF CANDIDATE SAN JOSE TRANSPORTATION MEASURES
WITH CLEAN AIR ACT SECTION 108(f) MEASURES

Section 108(f) Measures	Candidate San Jose Transportation Measures										
	Transit Mall	Guadalupe Corridor	Bus Fleet Expansion	County Park-and-Ride	City Parking Controls	Post Street Mall	Bicycle Routes and Lanes	Southern Pacific Improvements	Bay Area Rides Program	Employer Participation	Vapor Emissions Control
1. Motor Vehicle Inspection and Maintenance Programs											
2. Vapor Emission Control Programs											X
3. Improved Public Transit	X	X	X	X				X			
4. Exclusive Bus and Car-pool Lanes/ Area wide Car-pool Program	X	X							X	X	
5. Limiting Use of Section of Roadways to Common Carriers	X	X									
6. Long-range Transit Improvements	X	X	X	X				X			
7. On-street Parking Controls	X				X	X					
8. Park-and-Ride and Fringe Parking				X	X						
9. Pedestrian Malls	X					X					
10. Employer Incentive Programs										X	
11. Bicycle Lanes and Facilities							X				
12. Staggered Work Hours										X	
13. Road Use Charges or Tolls For Single Occupancy Auto Trips											
14. Controls on Extended Vehicle Idling											X
15. Traffic Flow Improvements		X									
16. Conversion of Fleet Vehicles to Cleaner Engines or Fuels											
17. Programs for Retro-fit of Emission Control Devices on Non-regulated Vehicles											
18. Programs to Reduce Emissions Caused by Extreme Cold Start Conditions											

- (2) Guadalupe Corridor - The Guadalupe Corridor includes a four-lane highway between I-280 and Curtner Road, a 750-vehicle county-wide bus fleet and upgraded Southern Pacific rail services on the existing line. (See Figure 15.) The principal criteria used in the selection of the Guadalupe Corridor improvements as a transportation mitigation measure were: a) improvements to public transit service through the provision of an efficient north/south connection between the county's southern residential areas and the employment centers to the north and in the downtown; b) ease of implementation (corridor runs along existing Route 85 and 87 right-of-ways); c) environmental quality (i.e., county-wide air quality improvements); d) parking management in the downtown area; e) areawide traffic circulation improvements; f) costs and financial feasibility (to be largely federally funded); g) compatibility with other downtown development projects such as the Transit Mall and the San Antonio Redevelopment Project; and h) beneficial economic effects on downtown retail, commercial and cultural development.
- (3) Bus Fleet Expansion - The Santa Clara County Transportation Agency (SCCTA) expects to increase its bus fleet to 750 vehicles by the mid-1980's ("750-Plan"), delivering reliable bus service to within one-quarter mile of approximately 80% of the county's population. The "516-Plan" was created in 1976, when county voters approved a one-half cent sales tax to support public transit. Under the "516-Plan", the bus fleet reached 516 buses by the end of 1981. The completed system will consist of a basic network of 50 routes covering about 250 square miles, with 15 minute headways most of the day on half of the routes and 30 minute headways on the other half. After construction of the proposed Guadalupe Corridor and the downtown Transit Mall projects, the bus network will service all major commercial and cultural activities and important employment centers in the county.

The primary criteria used in the selection of the "750-Plan" and the "516-Plan" were: a) improvements to Santa Clara County transit service through the increase in express bus routes and consequent reduction in commuter waiting times; b) reduced parking demands in the downtown area; c) pedestrian mobility; d) environmental quality; e) areawide traffic circulation improvements; f) costs and financial feasibility; g) compatibility with downtown development plans; and h) community acceptability (high demand for transit in the downtown area).

- (4) County Park-and-Ride - Along with the bus fleet expansion, the SCCTA plans to construct several park-and-ride facilities to support existing and future express bus system needs. Future park-and-ride lots will generally be located in the area south of Highway 280 and east of Highway 17, near residential areas in the South County and the beginning of many commute trips. The lots will be located along the proposed Guadalupe Corridor and service bus routes leading into the downtown area.

SCCTA plans to create an additional 500 parking spaces per year. It is estimated that when all future park-and-ride facilities are constructed (by 1990), they will be utilized by approximately 50 percent of express bus riders in the county. This program encourages transit ridership and reduces parking demand in the downtown area.

- (5) City Parking Controls - In 1977 the City of San Jose initiated a pilot program which provided shuttle bus service between the Central Business District (CBD) and a 400-space park-and-ride lot under Highway 280 at Vine and Almaden. This program was suspended in mid-1981 due to a lack of patronage, and will not be reviewed until there is sufficient demand. San Jose is also considering a peripheral parking and fringe parking program to be implemented in the future, when development intensity and employment increases warrant it. Peripheral parking lots would be located 2,000 feet or more from the CBD and would be served by shuttle buses. Fringe and peripheral parking lots are planned to provide approximately 5,000 additional spaces.

On-street parking is currently prohibited on segments of Market, Second, St. James, St. John, Santa Clara, San Fernando and San Carlos Streets. When the downtown Transit Mall is constructed, there will be additional on-street parking restrictions along First and Second Streets (between St. James and San Carlos Streets). These parking restrictions have been implemented: 1) to allow bus stops, 2) to allow loading zones, and 3) to facilitate traffic circulation.

- (6) Post Street Mall (Existing) - The Post Street Mall is a pedestrian mall located along Post Street between South Market Street and South First Street. Improvements to this mall were approved by the City of San Jose and the San Jose Redevelopment Agency in 1978 and are now under construction. One of the principal objectives of the mall is to encourage pedestrian-oriented retail activity.

- (7) Bicycle Routes and Lanes (Existing) - In the vicinity of the study area, bicycle routes run along Williams, Sixteenth, Seventeenth, San Antonio, St. John and St. James Streets. Bicycle lanes are also located along Fifth, Seventh, St. James and Seventeenth Streets.
- (8) Southern Pacific Improvements - A variety of capital and operational improvements are being implemented and planned for the Southern Pacific (SP) service, including:
 - o Lease/purchase of existing SP train stations
 - o Rehabilitation and improvement of SP train stations, including additional parking facilities
 - o Construction of new SP train stations
 - o Rehabilitation of rail trackage
 - o Lease/purchase of cars, coaches, locomotives, and equipment for improved, effective and efficient operations

Operational improvements include a 30% subsidy program and the addition of 52 daily trains to upgrade service and encourage "reverse direction" commuters. Since Southern Pacific has significant available capacity and provides a high speed link through congested areas of Santa Clara County, efforts are being made to increase its share of commuter trips within the county. These efforts include: 1) connecting local and express buses to the SP depot; 2) providing additional bicycle and auto parking at the SP depot; 3) connecting shuttle service from North County SP depots to industrial areas; and 4) providing combined ticketing or free transfers from train to bus. Relocation of the San Jose depot to North First Street is also being considered. The relocation would provide a convenient interconnection between the Transit Mall and SP.

The planned improvements to the SP service were selected as candidate mitigation measures based upon the following criteria: a) improvements to commuter transit service; b) compatibility with downtown development; c) parking management; d) improvements to areawide traffic circulation; and e) environmental quality.

- (9) Bay Area RIDES Program (Existing) - The Bay Area RIDES Program coordinates car and vanpooling for the entire Bay Area, including Santa Clara County. Interested persons are provided with a list ("Match List") of all other interested persons having similar origins, destinations and working hours. The origin and destination information is stored and organized by computer and is updated every six months. The RIDES Program also provides assistance in establishing vanpools. Ten or

more persons wishing to start a vanpool are assisted in obtaining a leased van and proper operator's license for one principal and two back-up drivers.

- (10) Employer Participation (Existing) - The Santa Clara County Manufacturing Group has established an aggressive program to reduce the number of single-occupancy vehicle work trips. The major member companies participating in the transportation program include: Lockheed, General Electric, IBM, Memorex, Rolm, FMC, Hewlett-Packard, Signetics Corporation, GTE Sylvania and Beckman Instruments. Each of these companies sponsors a transportation coordinator, and provides various incentives to reduce single-occupancy vehicles. These incentives include bicycle lockers and showers for people bicycling to work, closer and more convenient parking for vanpools and carpools, and free bus passes. Some companies enable employees who participate in these transportation programs to participate in a lottery for company stock or other prizes. This program contributes to the reduction of traffic congestion problems and reduces employee parking requirements.
- (11) Vapor Emissions Control (Existing) - In the San Francisco Bay Area vapor emissions at gasoline service stations are controlled by a vapor recovery system. Vapors from gasoline and other fuel delivery trucks are also controlled by vapor recovery systems. Vapor recovery devices are mandated in the San Francisco Bay Area by a rule of the Bay Area Air Quality Management District.
- (12) Control of Extended Vehicle Idling (Existing) - Control of extended vehicle idling is provided by the San Jose City Council Policy 6-10. This policy discourages drive-up windows at banks, restaurants and other commercial establishments in the downtown area of San Jose, including the study area designated in this report. Provisions of this policy also prohibit or discourage drive-up commercial development elsewhere within the city.

The candidate transportation measures listed above satisfy one or more of the provisions of Section 108(f) of the Clean Air Act to reduce or control air pollutant emissions. Those provisions of Section 108 (f) that are fulfilled by each mitigation measure are listed on the matrix in Table 27. As shown on the matrix, provisions for items 13, 16, 17 and 18 were not selected for implementation and are not fulfilled by the candidate mitigation measures. (Item 1, motor vehicle inspection and maintenance, is considered to be a motor vehicle emissions control measure.) The reasons for not selecting these items for implementation are given below.

- (13) Tolls and Road User Charges - A program of road user charges or tolls for single-occupancy vehicles (or differential rates to discourage single-occupancy vehicles) was not selected as a candidate mitigation measure because it would be impractical to implement. Toll roads are effective when one roadway segment provides the single shortest or fastest link between two points, such as a bridge across a river or a bay. Under these conditions, a toll station can be constructed at one end of the bridge or road segment. However, in the Greater San Jose Area there is no such single roadway segment, but rather a network of freeways, highway, expressways, and other roadways. The installation of a toll collection facility would only serve to further reduce the flow of traffic on a particular route and divert vehicles to alternative routes. In addition, delays and idling, as well as stops and starts at the toll facility, would tend to offset the air quality benefits of decreased single-occupancy vehicle use.
- (16) Conversion of Fleet Vehicles to Cleaner Engines or Fuels - The conversion of fleet vehicles to cleaner engines or fuels was not selected as a candidate mitigation measure due to difficulties in implementation and enforcement. These difficulties result from the fact that vehicles are registered with the State, rather than with local jurisdictions. Therefore, no mechanism is available for implementing and enforcing the conversion of fleet vehicles at the local level without duplicating State registration procedures. For this reason, a program to convert fleet vehicles would be most effectively and efficiently implemented by the State. In addition, the benefits that would be realized are estimated to be small, since the percentage of fleet vehicle miles is a relatively small percentage of the total vehicle miles.
- (17) Retrofitting of Emission Devices - A program for retrofitting emission devices or controls on vehicles and engines (other than light-duty vehicles, not subject to regulation under Section 202, Title 2 of the Clean Air Act) was not selected. The reasons for not selecting this program were essentially the same as for the previous mitigation measure (16. Conversion of Fleet Vehicles). Specifically, a retrofitting program was not selected because of difficulty and expense of implementation and enforcement, and because the actual emission reduction benefits are estimated to be small relative to the expense and effort of implementation.

- (18) Programs to Reduce Emissions Caused by Extreme Cold Start Conditions - Programs to reduce emissions from extreme cold start conditions were not selected as a candidate mitigation measure because the Greater San Jose Area does not experience conditions of extreme cold.

With the exception of the Guadalupe Corridor light rail transit system, all of the candidate mitigation measures described above are projected to be implemented by 1987. Therefore, these measures are assumed as part of the 1987 baseline case. While the light rail system is an approved part of the Guadalupe Corridor, the necessary federal commitment for funding is still pending. Therefore, light rail is considered to be a candidate control measure in control strategy development.

The projected high and pervasive background carbon monoxide level which approaches the eight-hour standard of 10 mg/m^3 has implications for strategy development. Since the local component of the concentration at an intersection is attributable to idling or free-flowing vehicles at the intersection, and the background component is generally attributable to areawide vehicle emissions, measures that reduce local traffic congestion would not be as effective in reducing background levels as measures that reduce emissions areawide would.

Therefore, another candidate measure in control strategy development is a motor vehicle inspection and maintenance (I/M) program. An I/M program would yield significant carbon monoxide air quality benefits regionwide. It would reduce carbon monoxide exhaust emissions from light- and medium-duty vehicles by 25% (ARB estimate) to 32% (EPA estimate) in 1987. The program would cost \$77,000,000 for the Bay Area, on an annualized basis, assuming a \$15 per vehicle fee and an average repair cost of \$30 per failed vehicle. The cost-effectiveness of an inspection program is estimated to be \$220 per ton of carbon monoxide (assuming that hydrocarbon reductions yield a cost-effectiveness of \$2,000 per ton of hydrocarbon).

The 1987 baseline projections of carbon monoxide concentrations in the downtown area are described in Section III.

The impact of an I/M program on projected 1987 CO concentrations in San Jose is shown in Figure 19 for programs with 32% (EPA estimated) control effectiveness. The standard is attained at all intersections under the more optimistic 32% assumption. Under the less optimistic 25% assumption, the standard would be exceeded by as much as 1 mg/m^3 at thirteen intersections in the downtown study area.

Although the impact of light rail transit on projected 1987 CO concentrations was found to be positive (it reduced local emissions), it was not nearly as effective as an inspection and maintenance program due to the relatively small impact of local vehicular emissions on ambient carbon monoxide.

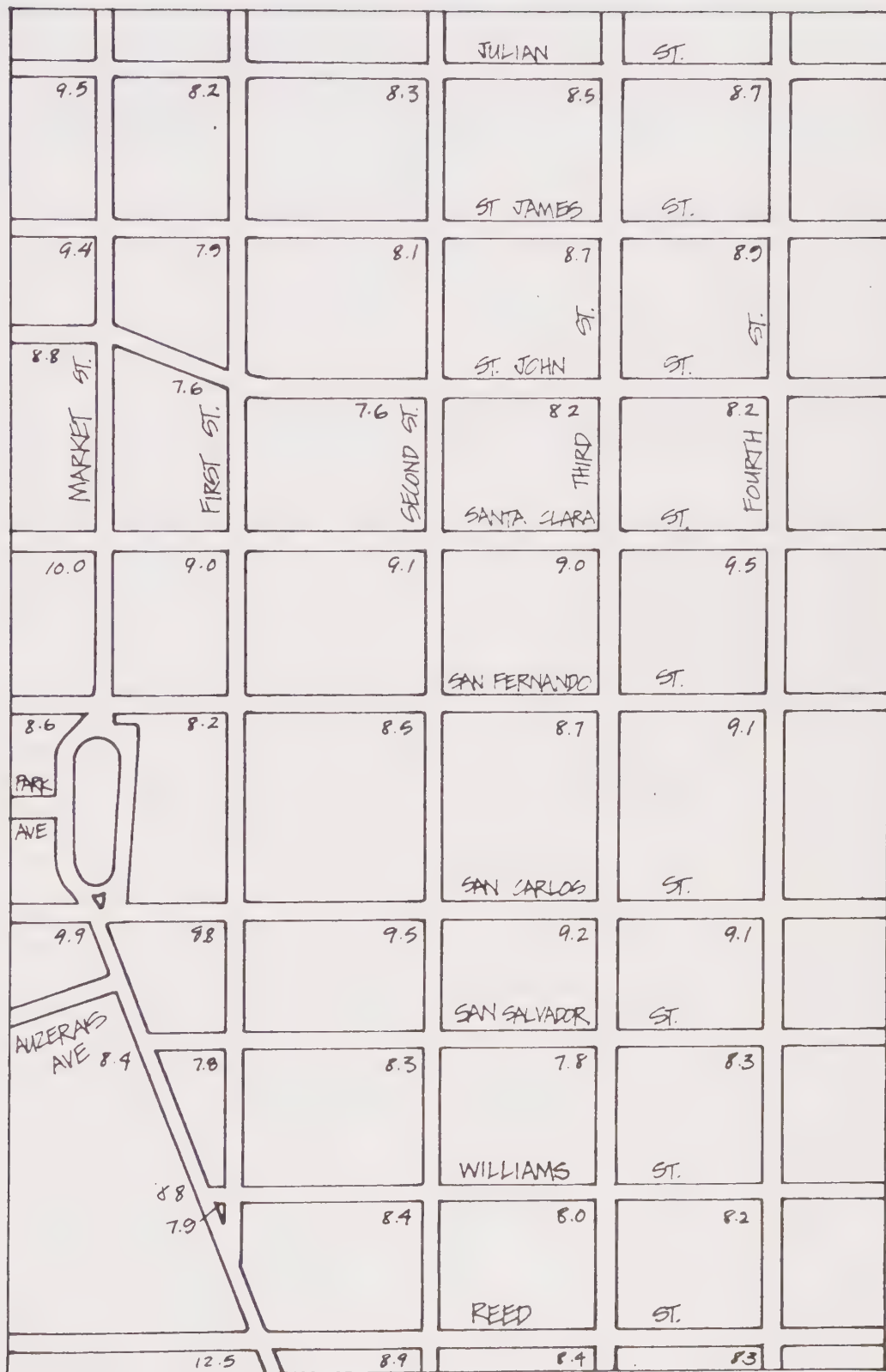


Figure 19. Expected 1987 CO Concentrations in Downtown San Jose with Motor Vehicle Inspection and Maintenance Program

Two other control measures designed to reduce local emissions are Advisory Review and Conformity Assessment. Although their air quality benefits cannot be determined, the merits of implementing these measures are as follows: (1) the institutional mechanisms already exist; (2) they force federal agencies and local jurisdictions to focus on air quality problems; (3) only those jurisdictions with air quality problems are affected; and (4) potential air quality problems can be mitigated.

The recommended control strategy in San Jose therefore consists of the following measures:

- o Motor Vehicle Inspection and Maintenance
- o Advisory Review
- o Conformity Assessment

Contingency measures, which would be implemented if it were found that reasonable further progress toward attainment was not being made, are as follows:

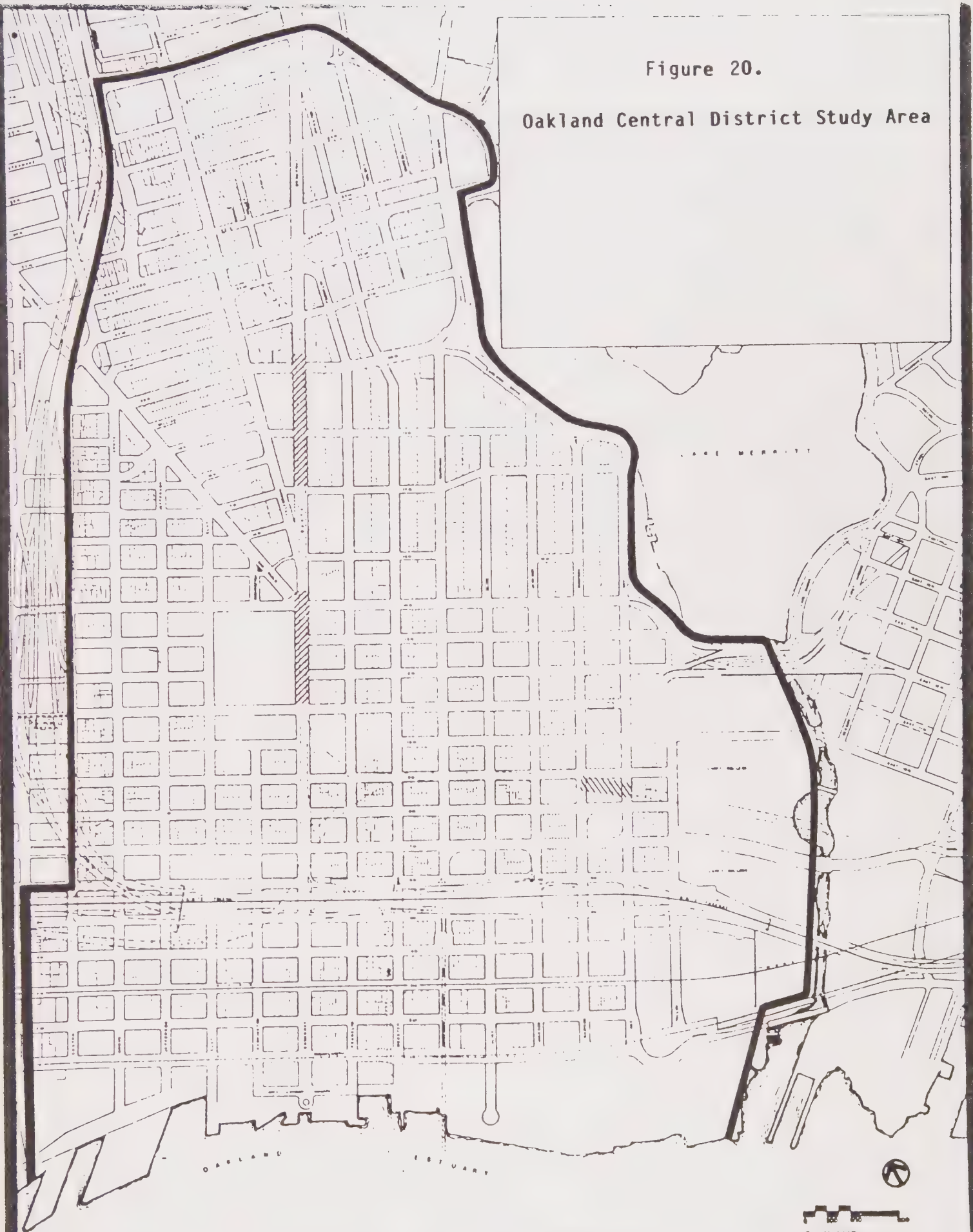
- o Implement more stringent statewide carbon monoxide exhaust emission standards on light-duty vehicles--approximately 50% reduction from current prescribed levels (7 to 3.4 gm/mile). (This measure is already recommended in the 1979 Plan for implementation by 1990.)
- o Implement the recommendations of the Santa Clara Valley Corridor Evaluation, which include a light rail transit system for the Guadalupe Corridor. (This measure is currently being pursued, but is included as a contingency measure because funding is not certain at this time.)

Oakland

The 1987 baseline projection for the Oakland hot spot site indicates attainment. This is a tentative finding only, however, because significant commercial growth is being forecast for downtown Oakland over the next ten to fifteen years. Most of the development would occur in the Central District Area shown in Figure 20. Some eighteen million gross square feet (gsf) of office space are being planned, or more than double the office floor area that currently exists. Almost two million gsf of retail space, 1,000 hotel rooms and up to 1,500 residential units are also being proposed or are under construction. The status and scope of the projects were not sufficiently defined at the time the baseline inventory was being developed; therefore, they are not in the baseline cases. The impacts of these new projects on traffic circulation and air quality could be substantial; unfortunately, an analysis of the potential impacts and a determination of mitigation measures are beyond the time frame and scope of this plan.

Figure 20.

Oakland Central District Study Area



OAKLAND CENTRAL DISTRICT

OAKLAND
CITY PLANNING
DEPARTMENT

Since these development proposals will establish the Central Business District as a major travel destination in the Bay Area, potential impacts on CO air quality are of concern for Oakland. In order to identify contingency control measures, a study of the cumulative impacts of downtown development is needed to determine future transportation problems and to identify appropriate mitigation measures.

Environmental impact reports (EIRs) identify the traffic and air quality impacts of individual projects, but the determination of the cumulative impacts of all the projects is beyond the scope of any single report. At present, a transit improvement study for the Central Business District is looking at the impacts of growth on transit. Transit, however, is only one aspect of the transportation problem.

There is a need for a comprehensive transportation and air quality study of future traffic circulation, transit capacity and operations, parking capacity, funding opportunities for transportation systems improvements and air quality. The study would examine what role transit would play in serving future development, which areas would experience severe congestion, and consequently, air quality problems and what transportation improvements would be needed to mitigate these impacts.

The City of Oakland is identifying funding for the transportation and traffic analysis portions of the study. ABAG, BAAQMD, and MTC would provide technical assistance to the City for the air quality assessment portion of the study. This assessment would include an intensive hot spot monitoring program to establish background concentration levels, the ambient carbon monoxide and the effects of meteorology and topography on ambient carbon monoxide. Mitigation measures would be identified and assessed in conjunction with the transportation study. Thus, the recommended control strategy in Oakland is:

- o Perform a Comprehensive Transportation Plan and Air Quality Analysis of Oakland Central Business District Development
- o Advisory Review of Plans and Projects
- o Conformity Assessment

Advisory Review and Conformity Assessment are recommended for the same reasons described for San Jose. Contingency measures for Oakland would be:

- o Inspection and Maintenance
- o Implement more stringent CO exhaust emission standards in light-duty vehicles--approximately 50% reduction from current prescribed levels (7 to 3.4 gm/mile).
- o Additional measures pending results of the comprehensive transportation and air quality analysis of Oakland Central Business District development.

Vallejo

The design value for Vallejo is close to the standard--12 mg/m³. The 1987 baseline projection indicates that the eight-hour federal standard will be attained. This will be as a result of (1) more, cleaner cars on the roads due to continued implementation of State vehicle emissions standards; and (2) traffic levels are not expected to grow dramatically in Vallejo as they are in San Jose and Oakland. No control additional measures are recommended for Vallejo.

RECOMMENDED CARBON MONOXIDE CONTROL STRATEGY

In summary, the objective of the carbon monoxide control strategy is to attain the federal eight-hour standard in the Bay Area. Based upon special hot spot and permanent monitoring data, three cities have design values above the 10 mg/m³ standard: San Jose - 18 mg/m³, Oakland - 16 mg/m³ and Vallejo - 12 mg/m³. A key factor in control strategy design was the issue of background contribution to the total concentration. Under certain circumstances measures that reduce local traffic congestion would not be as effective as measures that reduce emissions areawide.

The carbon monoxide control strategy is summarized in Table 28. The list of control measures comprising the strategy is divided into four categories for each city: (a) those recommended for implementation; (b) those to be held in reserve as contingency; (c) additional measures; and (d) those not reasonably available. Contingency measures are identified to satisfy EPA guidelines for approval of 1982 SIP revisions. The measures listed in the contingency plan would be considered for implementation if it were later found that "reasonable further progress" toward attainment was not being made. Additional measures make up a special category which was recommended for inclusion by the Joint Air Quality Planning and Advisory Committee. These measures are also part of the ozone control strategy and are described in Section IV. "Not reasonably available" measures may be technically effective, but are not recommended for implementation or inclusion in the contingency plan at this time.

The rationale for the last two categories of control measures (additional and not reasonably available) is to demonstrate that all alternatives have been considered. Measures considered not reasonably available were rejected because they are infeasible for economic, enforcement or implementation reasons or unnecessary due to the existence of more effective measures. In some cases, effectiveness is not possible to quantify or is judged marginal.

In San Jose, where of the three cities the carbon monoxide problem is more severe, three measures are recommended for implementation--Inspection and Maintenance, Advisory Review, and Conformity Assessment. In Oakland, a comprehensive transportation plan and air quality analysis, Advisory Review, and Conformity Assessment are recommended. In Vallejo, the trend toward lower vehicle emissions as a result of the existing California vehicle emissions program is sufficient to attain the CO standard by 1987.

TABLE 28. SUMMARY OF RECOMMENDED CARBON MONOXIDE CONTROL STRATEGIES

San Jose	Oakland	Vallejo
<u>Measures Recommended for Implementation</u>	<u>Measures Recommended for Implementation</u>	<u>Measures Recommended for Implementation</u>
o Motor Vehicle Inspection and Maintenance	o Comprehensive transportation plan and air quality analysis of Oakland CBD development	o None required
o Advisory Review		
o Conformity Assessment	o Advisory Review	
	o Conformity Assessment	
<u>Contingency Measures</u>	<u>Contingency Measures</u>	<u>Contingency Measures</u>
o Implement more stringent CO exhaust emission standards on light-duty vehicles--approximately 50% reduction from current prescribed levels (7 to 3.4 gm/mi)	o Implement more stringent CO exhaust emission standards on light-duty vehicles--approximately 50% reduction from current prescribed levels (7 to 3.4 gm/mi)	o None required
o Light Rail Transit System (Guadalupe Corridor)	o Additional measures pending results of transportation plan and air quality study.	
<u>Additional Measures</u>	<u>Additional Measures</u>	<u>Additional Measures</u>
o Land use controls	o Same as for San Jose	o None required
o Mandatory Indirect Source Review		
o Public support for transit		
o Additional transportation measures to be identified by the California Air Resources Board		
<u>Measures Not Reasonably Available</u>	<u>Measures Not Reasonably Available</u>	<u>Measures Not Reasonably Available</u>
o Limit commercial/retail development growth in CBD 1,2	o Limit commercial/retail development growth in CBD 1,2	o None required

1. Considered not reasonably available due to conflict with other objectives (e.g. economic revitalization of urban center)
2. Limited effectiveness, since urban background CO accounts for a significant portion of the total concentration, and this measure affects primarily the local CO component.

The implementation of more stringent statewide CO emission standards for light-duty vehicles (from 7 to 3.4 grams/mile) is recommended as a contingency measure for San Jose and Oakland. In San Jose, there is the additional contingency measure of implementing light rail transit system as part of the Guadalupe Corridor project. In Oakland, additional contingency measures will be identified by a comprehensive study of the transportation and air quality impacts of Central Business District development.

A control measure that is not reasonably available for San Jose or Oakland is to limit commercial/retail development growth. While such a limitation would prevent further deterioration of air quality in the Central Business District, it would be counter to the economic goals of the cities and the region. Furthermore, a limit on commercial/retail development in San Jose would have limited effectiveness due to the predominance of urban background CO in that area. A limit upon growth may reduce the localized CO component but this would have little effect on the background level.

SECTION VI

THE BENEFITS OF CLEANER AIR

This section summarizes the benefits of controlling the Bay Area's major air pollutants, ozone and carbon monoxide. In general, controlling these two pollutants would provide benefits in three major areas:

- o improvements in public health
- o reduction in damage to vegetation
- o reduction in damage to other materials

The information on ozone and carbon monoxide summarized here, therefore, will cover their respective effects on each of these three areas. In addition, where such data are available, estimates of the present costs from failure to institute adequate control measures will be given. As progress is made in carrying out the plan, such adverse effects and their concomitant costs will be significantly reduced or eliminated, thus forming the benefits of the plan.

OZONE

Ozone has been shown to cause a wide range of deleterious effects on humans, vegetation and materials at ambient concentrations found in the Bay Area (0.19 ppm).

Effects on Human Health

Ozone causes a wide variety of health problems (See Table 2) including irritation of the eyes and mucous membranes, impaired lung function and changes in the cellular composition of the lungs, increased susceptibility to infectious disease, biochemical imbalances in the lungs and other organs, rapid pulse, lowered blood pressure, cough, chest discomfort and a general decrease in human performance (EPA 1981). Exposure to ozone also aggravates conditions such as asthma, chronic bronchitis and emphysema, and thus may cause moderate to severe disability in a large high risk group (EPA 1981).

The following studies demonstrate more of the health effects specifically attributed to ozone exposure:

- o Statistically significant reduction in pulmonary function in nonsmokers and healthy smokers exposed to ozone at concentrations of .37 ppm, and possibly as low as .10 ppm (EPA 1978a);
- o Animal studies have demonstrated effects such as chromosomal damage, mutagenicity, morphological changes in the lung, altered enzyme activity and increased susceptibility, among others; humans may experience similar effects, although their likelihood is unknown at present (EPA 1978a);

- o One study demonstrated thresholds of chest discomfort at .25-.29 ppm, cough at .30-.39 ppm and headache at .15-.19 ppm (EPA 1978a);
- o Decreased ventilatory function in school children associated with ambient ozone concentrations from .10-.30 ppm; this is of additional concern for children due to the decrease in lung elasticity and overdistention demonstrated in animal studies (EPA 1978b);
- o Impaired lung function and increased asthma attacks and other respiratory symptoms in high risk groups with short term exposures to .15 ppm - .25 ppm ozone (EPA 1978a);
- o Eye irritation beginning at exposures to .10 ppm ozone and increasing with higher exposure (EPA 1981);
- o Increased lysis of erythrocytes (destruction of blood cells) in healthy subjects exposed to .5 ppm ozone and intermittent light exercise (EPA 1978a);
- o Statistically significant positive association between hourly ozone levels and frequency of automobile accidents in Los Angeles (possibly due to decreased visual acuity, visibility, eye irritation or performance impairment) (EPA 1978a).

Long term exposure effects from ozone are not as well known due to the long latency period for certain diseases (e.g. 20-40 years for lung cancer) whose effects may, therefore, not yet be detectable. However, it is apparent that short term exposure to ozone produces a variety of negative effects on human health, particularly to the aforementioned high risk groups. A single exposure of a sensitive individual (e.g. an asthmatic) may induce serious health effects; repeated exposures of even healthy individuals may lead to increased risk of respiratory impairment in the form of irreversible effects or susceptibility to chronic respiratory disease--such effects may occur at ozone levels as low as .15 - .25 ppm. (EPA 1978b).

Effects On Vegetation

Ozone is highly toxic to a variety of plants and, as it affects them, it potentially affects entire ecosystems. The economic losses nationwide due to vegetation damage from ozone and other photochemical oxidants was estimated in 1978 to be \$300 million (EPA 1978c). The following studies demonstrate further the dramatic impact of ozone on vegetation:

- o Studies of ozone in ambient air reported up to a 50% decrease in yield of citrus trees, a 10-15% decrease in grape yield followed by a 50-60% decrease the next year, a 5-29% decrease in yield of cotton lint and seed, losses of 50% in some sensitive potato, tobacco and soybean cultivars (plants), and a 30% decrease in wheat yield (EPA 1978a);

- o The threshold for effects from ozone on sensitive cultivars appears to be .05-.10 ppm (EPA 1979);
- o Foliar injury rates of only 5-10% (such rates are commonly exceeded in sensitive cultivars such as alfalfa, broccoli, spinach, petunia, etc.) could produce detectable reductions in growth or yield (EPA 1978c);
- o Significant growth and yield effects could occur if the average ozone concentration exceeds .05 ppm beyond 15 days (EPA 1978c);
- o Adverse effects of short term exposure to ozone have been noted as follows: trees and shrubs - .20-.51 ppm for 1 hr, .20-.25 ppm for 2 hrs, .06-.17 ppm for 4 hrs; agricultural crops - .20-.41 ppm for 1/2 hr; .10-.25 ppm for 1 hr, .04-.09 ppm for 4 hrs (EPA 1978a);
- o Certain crops, such as snapdragons and chrysanthemums, are no longer grown in the Bay Area due to air pollution, and many ornamental growers have been forced to move their operations out of the area (ABAG 1977);
- o Estimated losses to cut flower growers in the Bay Area in 1970 was approximately \$1 million and has most likely increased (ABAG 1977).

It is clear that vegetation of all kinds are affected by levels of ozone air pollution in the Bay Area. The available data suggest damage to vegetation may range from several million dollars upwards to tens of millions of dollars. Reduction of ozone levels would have a significant impact on preventing such damage and costs.

Effects On Materials

As with humans and vegetation, ozone has negative effects on man-made materials. It has been shown to cause more rapid deterioration of rubber products, fading in textiles, carpets, clothes and paint dyes, and more rapid deterioration of fibers in many textile products.

The costs of such effects are high, and take two forms--the indirect cost of preventive measures, such as the addition of anti-cracking agents to tires, and the more direct cost to the consumer who must replace worn out materials earlier. For example, one study in 1970 estimated the nationwide economic impact of accelerated rubber aging (cracking) on the consumer to be \$500 million-- \$170 million in preventive agents added to the products and \$330 million due to premature failure replacement costs (EPA 1978a). Further, if the national annual average concentration of ozone were reduced from .033 ppm to .026 ppm, it is estimated that there would be a savings, from rubber damage alone, of from \$37-\$61 million (EPA 1978a).

Locally, it is estimated that by the year 2000, all other factors being equal, Bay Area residents will pay between \$12 and \$39 million per year (in 1975 dollars) as a result of ozone damage to materials (ABAG 1977).

CARBON MONOXIDE

Carbon monoxide (CO) has been shown to have deleterious effects, such as those identified below and in Table 1, at the ambient levels found in the Bay Area (17 ppm) and thus are of concern.

Effects on Human Health

Briefly, CO displaces oxygen in the blood which, in turn, decreases the supply of oxygen to various parts of the body, particularly the cardiovascular and central nervous systems.

The specific effect CO has on humans depends both on its concentrations and the duration of exposure. Acute exposures to levels as low as 15-18 ppm have produced cardiovascular and nervous system effects such as decreased alertness, muscular incoordination, decreased learning ability and visual perception, changes in sleep patterns and decreased manual dexterity in healthy subjects (EPA 1979).

In addition, large segments of the population are at increased risk from CO exposure - such high risk groups include fetuses, persons with cardiovascular or nervous system conditions, sickle cell anemics, the young and the elderly, and people who use drugs (EPA 1979).

Table 1 summarizes some of the health effects from CO exposure, and other studies have demonstrated the following effects:

- o Peripheral arteriosclerosis, diminished exercise capacity and intermittent claudication (lameness) in angina patients exposed to 15-18 ppm CO; the exacerbation of angina can result in more serious cardiovascular damage (EPA 1979);
- o Dilation of coronary blood vessels after chronic exposure to 15-30 ppm CO; these vessels supply blood to the heart itself, and coronary damage or other vascular effects may result as the vascular system is forced to function beyond its capacity (EPA 1981);
- o A 4-year study in Los Angeles showed a greater number of deaths when ambient CO concentrations were higher (EPA 1979);
- o Animal studies have shown fetal abnormalities such as lower birth weight, slower postnatal weight gain, decreased brain protein levels and decreased activity levels in the first year after birth; the implications are clearly of concern to humans since the fetus under normal circumstances may be functioning at nearly critical tissue oxygen levels which even moderate CO exposure could upset, thus affecting development (EPA 1981);
- o Prolonged low level exposure to CO may influence changes in circulating blood platelet counts and/or congenital platelet function disorders in man based on the results of animal experiments (Kalmaz, et al. 1980).

Although little is yet known about the interaction of CO with other pollutants, drugs and environmental conditions, the aforementioned studies demonstrate the importance of reducing current levels of ambient CO in the air in order to protect public health.

Effects On Vegetation

CO is a normal constituent of the plant environment - many species are capable of absorbing and metabolizing CO photosynthetically, and some even function as net producers, emitting more than they absorb. It is therefore generally necessary to expose vegetation to atypically high levels of CO before deleterious effects are seen. One serious side effect on vegetation that has been noted is that chronic exposure to CO levels as low as 20 ppm may suppress the nitrogen-fixing bacteria in root nodules of legumes, or produce abnormal leaf formation in pea and bean seedlings.

Effects on Materials

To date there do not appear to be any studies or data on the effects of CO on other materials.

EFFECTS AND COSTS OF MULTIPLE POLLUTANTS

It should be noted that most of these data represent the effect of one pollutant alone, yet in the environment pollutants are found together and, since their combined effects can be additive or synergistic, the implications from these studies may represent underestimations of their true damaging potential.

For the purposes of estimating costs from pollution, however, most studies consider the combined effects of all air pollution constituents together. Two studies provide a general assessment of some of the less often quantified costs from failure to institute adequate pollution control:

- o Increased hospitalization costs due only to exposure to ambient levels of air pollution in Allegheny County, Pennsylvania were found to be an estimated \$ 9.8 million per year (Carpenter, et al. 1979);
- o The annual health costs from pollution were estimated to be \$250 for every family in the United States, suggesting that the costs of air pollution control are more than offset by the damages to public health from unabated air pollution (Ostro 1980);
- o A survey performed by SRI International concluded that in the Bay Area the "willingness to pay" for a 30% improvement in visibility and health (related to air pollution) is estimated to be \$85 million annually (SRI, 1981).

- o A 1978 report by the President's Council on Environmental Quality estimated that, nationally, air pollution controls saved or prolonged approximately 14,000 lives, and saved approximately \$21.4 billion compared to expenditures of \$19 billion for air pollution controls in 1978 (Council on Environmental Quality 1978).

CONCLUSIONS

Despite the usual limitations and uncertainties data may hold, the evidence presented here makes it clear that ozone and carbon monoxide can temporarily or permanently damage or destroy human health and vegetation as well as man-made materials. The economic costs of such effects are enormous, probably reaching hundreds of millions of dollars in the Bay Area alone. But other costs are also borne, such as human costs from suffering, inconvenience, incapacitation and environmental costs from irreversible ecological damage, etc. The benefits of controlling ozone and carbon monoxide lie, therefore, in the reduction or elimination of such effects and costs--these are the benefits which will be obtained as this plan is carried out.

SECTION VII

FUTURE ACTIVITIES

POTENTIAL TRENDS

Future air quality in the Bay Area could well be affected by changes in society which may just now be emerging and are, therefore, not fully accounted for elsewhere in this update. For instance, shifts in regional growth patterns, in automobile technology, and even in lifestyles--especially in work and travel behavior--can have significant impacts. These phenomena may be influenced by social, economic and technological forces motivated by concerns other than improvement of air quality, but air quality may be affected nevertheless. The 1982 plan has emphasized strategies needed to meet short-term deadlines--attainment of ambient air quality standards by 1987. These programs will also help preserve the region's air quality over the longer term. However, continued growth in the Bay Area is expected as more people, jobs and industries are added to the region; air quality is likely to deteriorate and will eventually offset technological improvements in industrial and motor vehicle control systems. The lead time for implementing new air quality management strategies is fairly long. Actions that work to ensure long-term maintenance of air quality standards need to begin early. A vision of the future--and actions to affect the future--are needed if clean air is to be a reality in the year 2000 and beyond.

For the examples given below no emissions credits are being taken in this plan. These programs need to be carefully considered as part of a long term maintenance strategy. Many questions regarding financing and institutional responsibility need to be worked out. Most of these measures are "unenforceable" in the traditional sense, and deal more with basic lifestyle changes to improve air quality. To the extent that they occur it will be because of forces quite outside the control of the three co-lead air quality planning agencies. Nonetheless, illustrations of "just-over-the horizon" possibilities are outlined here so that the public and policy makers are well informed and better able to encourage these and other positive actions toward attainment and maintenance of satisfactory air quality. Hypotheses about potentially significant trends also help air quality planners to identify problems for future monitoring.

Examples:

- 1) The so-called "compact growth scenario" for regional development, studied for the 1979 AQMP but excluded as a set of control measures, may in fact be occurring to some degree. There is some evidence in the Bay Area of housing density increases along established transit routes within existing cities. This may be due to high costs of land for housing, efforts toward mitigating the regional housing shortage, high fuel and other travel costs, and open-space conservation efforts, among other motivations. It has led to zoning changes, density bonuses, infill development, urban renewal, and

"gentrification" of older areas. Correspondingly, there are also some recent projects and emerging plans for "mixed" land use development--including services, work-places and housing within single projects--and for industrial and commercial developments, e.g., large center-city headquartered corporations are relocating functional divisions near suburban, residential areas. To the degree that these newer trends counterbalance the traditional pattern of new housing located ever further from center-city workplaces, there should be a reduction in daily trips and in vehicle-miles-traveled (VMT) to work and to services. Studies now underway at ABAG and at MTC may demonstrate if, and to what degree, the region is moving toward a more "compact growth scenario."

A cautionary note seems appropriate. While compact growth should lead to a reduction in regional vehicle-generated emissions, overly dense development can exacerbate local problems. This is especially true for downtown areas where CO problems can be intensified if increased concentration of urban activities also results in increased traffic congestion.

- 2) More widespread use of cleaner fuels and/or alternative engines and vehicles (including electric) could have positive effects on air quality directly proportional to how much of the conventional fleet and travel use they replace. If there are breakthroughs in technology, in economic feasibility, and/or in consumer auto tastes, the impacts could be much greater than those estimated in the earlier TCM analysis.
- 3) Voluntary changes could occur in the living and working patterns of Bay Area residents with potentially significant impacts on air quality. In particular, work arrangements could be modified as a result of agreements between employers and employees in commercial and industrial firms, if both perceive the changes to be mutually beneficial.

Four voluntary maintenance measures described below share several common features: they are work-related; the air quality benefits occur through reductions of vehicle-miles-traveled and total daily trips; they reduce hydrocarbon (HC) and nitrogen oxides (NOx) in about equal amounts and so are inefficient ways to maintain (or attain) the ozone standard; they are most effective as carbon monoxide (CO) maintenance measures; and they have some benefit for maintenance of the present attainment status of NOx and of particulates.

Most transportation control measures (TCMs) have similar characteristics, but the following measures are not considered to be true TCMs. These measures complement the land use measures previously described.

- o Compressed Work Week - A monitored Denver experiment indicates that a voluntary, four-day work week could reduce both work-trips and non-work trips. According to estimates based on studies made for the U.S. Department of Transportation (USDOT, 1981), total VMT could be reduced by as much as 6 percent if such work arrangements were to become widespread.

Difficulties with this measure are: not all firms have found this measure satisfactory after trying it; management must implement carefully planned scheduling; and productivity must not suffer. Air quality benefits are achieved only if the work-related travel is not replaced by an equal or greater amount of non-work-related travel.

- o Flex-Time - This program is most useful for reducing automobile congestion. It has also been demonstrated in certain cases to increase transit use. Peak travel periods of crowded transit vehicles can be reduced. Also, car and van-pooling have been shown to increase due to flex-time. The achievable percent reduction in journey-to-work VMT on a voluntary basis is unknown.

- o Work-at-Home - Great changes are occurring now and will continue to occur in communication and computing networks. Computing power is being widely distributed in ever cheaper devices. These technological changes could allow some workers to perform their assigned jobs without leaving home. The potential effect is, again, to reduce the journey-to-work VMT. The word "telecommuting" has been suggested to describe this scenario. The achievable percent reduction in journey-to-work VMT is not identifiable. If 5 percent of the work force were working at home, the total VMT could be reduced by almost one percent.

Difficulties with this measure are: management must implement carefully planned scheduling; productivity must not suffer; and many workers appear to prefer the social and professional interaction of the group work place.

TRAVEL MONITORING SYSTEM

A system for monitoring trends in regional travel is being developed to determine if the growth in travel is consistent with that assumed in the Air Quality Plan. The mobile source emissions inventories are based on travel simulations for the years 1979 and 1987. The transportation controls which are adopted will reduce vehicular travel from these baseline projections. Figures 21 and 22 show the growth in vehicle trips and vehicle-miles-traveled (VMT) for the baseline and for the control alternative.

Figure 21. Vehicle Trips in Bay Area: Non-Commercial Travel

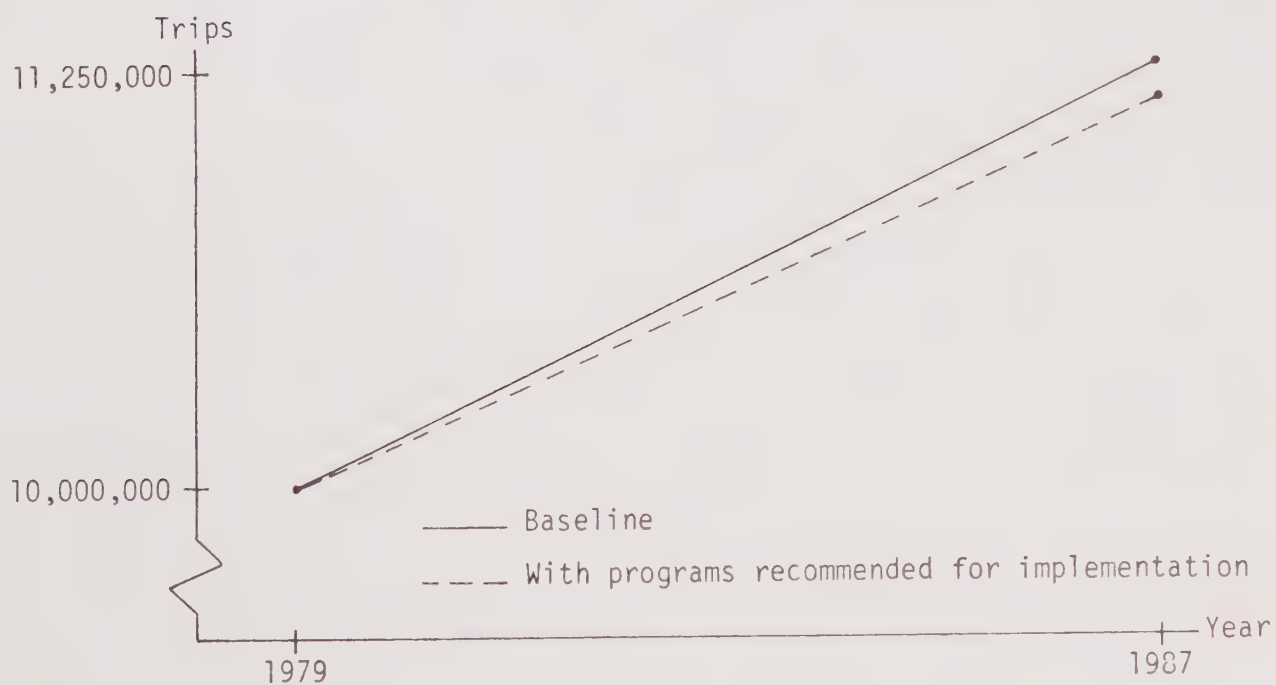
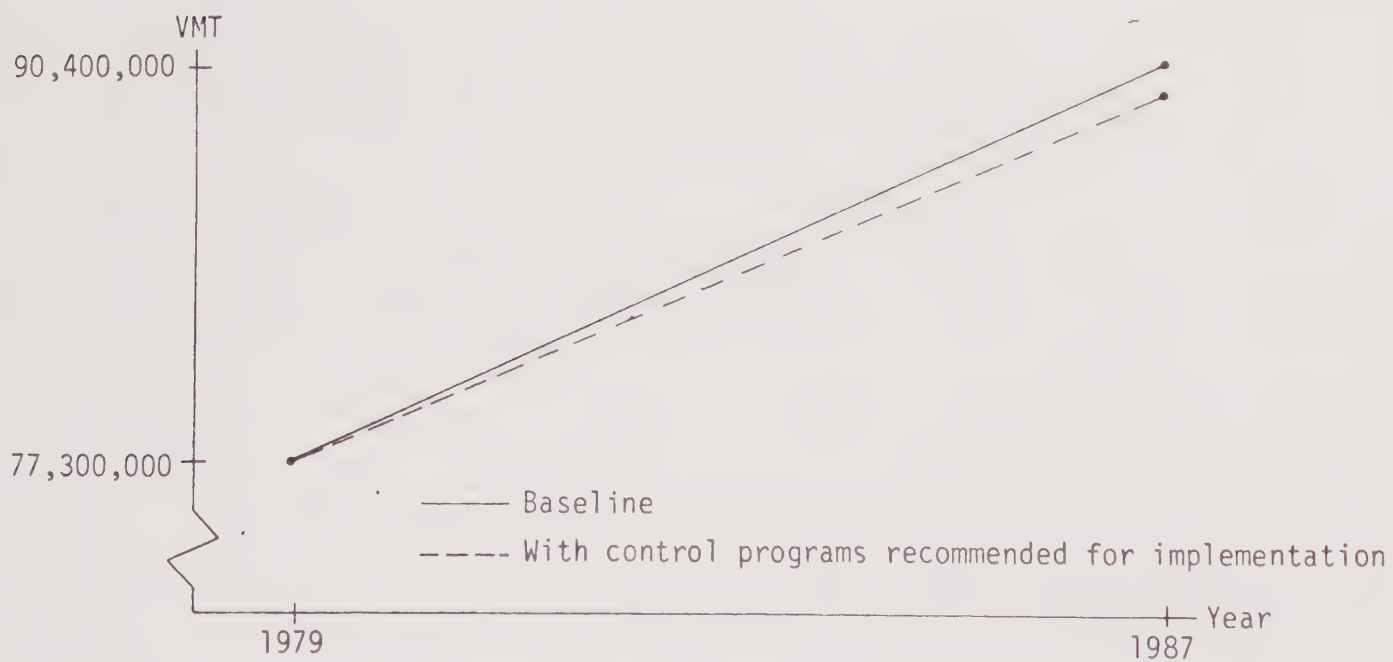


Figure 22. VMT in Bay Area: Total Travel



Ideally, one would like to collect sufficient travel data to be able to assess the effectiveness of the individual transportation controls. However, it would be quite expensive to collect such data. Accordingly, MTC will continue to include in the annual air quality reports data which is normally collected on auto occupancies, transit ridership, number of carpools, etc. Together, these give an indication of general trends, but cannot be used to assess individual transportation measures.

To assess reasonable further progress, MTC will concentrate on developing an annual estimate of regional VMT to compare with the assumed growth shown in Figure 22. If the actual VMT is equal to or below the projected VMT for the control alternative, this region will be making reasonable further progress towards the air quality goals. If the growth is higher than projected, the contingency provisions will be initiated.

The regional VMT estimate will be derived from a sample of traffic counts taken throughout the region. An inventory of all state highway segments in the Bay Area and all arterials and major collectors under local jurisdiction has been compiled as part of the Highway Performance Monitoring System (HPMS). This program is being conducted pursuant to a requirement of the U.S. Federal Highway Administration. A sample has been selected from this inventory. Annual traffic counts will be taken on this sample and an estimate of regional VMT developed from these.

ANNUAL AIR QUALITY REPORTS

Annual air quality reports are prepared in response to Sections 171, 172 and 173 of the 1977 Clean Air Act Amendments, and in response to annual report requirements issued by the U.S. Environmental Protection Agency and the California Air Resources Board. Their purpose is to provide the public and regulatory agencies with a progress report on the effectiveness of air pollution control programs in reducing both emissions and ambient levels of air pollutants in the Bay Area.

The goal of the 1982 Bay Area Air Quality Plan is to achieve ambient air quality standards in the Bay Area by 1987 by controlling pollutant emissions. Assessing the effectiveness of control programs on an annual basis will identify successes or failures of the programs in meeting the goal of the 1982 Plan. If emissions are not decreasing at rates that will allow standard attainment by 1987, then further controls must be adopted and implemented.

Thus, the annual reports will serve as the principal vehicle for determining needs, evaluating options, and amending the plan. Future annual reports will include the following items:

- o Updated emission inventories and emission inventory projections;
- o Updated assessments of ambient air quality in the preceding year and developing trends;

- o Updated assessments of demographic and economic trends in the Bay Area;
- o Results from a regional travel monitoring system designed to track trends in vehicular travel in the Bay Area;
- o Review of progress in implementing the control programs adopted in the 1979 and 1982 Bay Area Air Quality Plans;
- o Review of changes in the specification of reasonably available control technology (RACT) and best available control technology (BACT) for various source categories;
- o Updates on the Air Resources Board's suggested control measure (SCM) process, and the applicability of such SCMs to the Bay Area;
- o Review of new State and federal regulations pertaining to the plan or to sources affected by the plan, as needed;
- o Assessment of whether "reasonable further progress" toward attainment of federal air quality standards was achieved during the previous year.

Future funding for this activity is uncertain, and the depth of coverage of each of these items will vary depending on the resources that can be made available for this purpose.

REFERENCES

Air Resources Board, March 1981, "Motor Vehicle Emissions Estimates," letter from Gary Rubenstein, Deputy Executive Officer, March 5, 1981, including memorandum from David Howekamp, Chief, Air Programs Branch, U.S. Environmental Protection Agency, Region IX, January 26, 1981.

Air Resources Board, January 1980, "Procedure and Basis for Estimating On-Road Motor Vehicle Emissions," Technical Services Division, State of California.

Association of Bay Area Governments, January 1979, Projections 79, Hotel Claremont, Berkeley, California, 94705.

Association of Bay Area Governments, Bay Area Air Pollution Control District, Metropolitan Transportation Commission, December 1977, Benefits of Photochemical Oxidant Control, Air Quality Technical Memorandum 13.

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission, January 1979, 1979 Bay Area Air Quality Plan, and "Report on Plan Modifications" (May 1979).

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission, March 1981, "Air Quality Planning in the San Francisco Bay Area a background paper."

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission, December 1981, "Status Report on the 1982 Bay Area Air Quality Plan" and Appendix A "Analysis of Transportation Strategies Identified in Section 108 (f) of the Clean Air Act."

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission, April 1982, "Proposed Control Measures Summary" (hydrocarbon emissions), including cover memo from Air Pollution Control Officer re: Workshop on Control Measures.

Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission, May 1982, "Control Options and Selection Process for the Draft 1982 Bay Area Air Quality Plan," a report to the Joint Air Quality Planning and Advisory Committee, including Appendix A "Stationary Source Controls," Appendix B "Transportation Control Measures" and Appendix C "Other Measures."

Bay Area Air Quality Management District, June 1982, "Source Category Methodology," 939 Ellis Street, San Francisco, California 94109.

Brady, R., August 1981, "Assessment of the Economic Impacts of New Source Review (NSR) on Selected Manufacturing Sectors in the San Francisco Bay Region," Air Quality Technical Memorandum 39, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Carpenter, et al., 1979, "Health Costs of Air Pollution: A Study of Hospitalization Costs," Am. J. Public Health, 69: 1232-1241, 1979.

Cheng, M., June 1980 (revised), "Evaluation and Selection of Carbon Monoxide Dispersion Models for Use in the 1982 Plan," Air Quality Technical Memorandum 29, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Council on Environmental Quality, December 1978, Environmental Quality: the Ninth Annual Report of the Council on Environmental Quality.

Crouse, W., et al., April 1981 (revised), "Energy Assumptions for the 1982 Plan," Air Quality Technical Memorandum 34, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Duker, D., April 1982, "Meteorology Used for LIRAQ Modeling of Prototype Days - 28 and 29 September 1978 and 11 and 12 September 1979" Air Quality Technical Memorandum 44, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Fong, J.S.L., et al., February 1980, "Comparability of Ambient CO Hotspot Monitoring Techniques," Air Quality Technical Memorandum 28, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Fong, J.S.L. and De Mandel, R.E., January 1982, "Ozone and Carbon Monoxide Design Values for the 1982 Plan," Air Quality Technical Memorandum 41, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Hunsaker, D., September 1980 (revised), "Assessing the Impacts of Air Quality Plans: Reviews and Recommendations," Air Quality Technical Memorandum 30, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Hunsaker, D., January 1981 (revised), "Selection of Biogenic Hydrocarbon Emission Factors for Land Cover Classes Found in the San Francisco Bay Area," Air Quality Technical Memorandum 31, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Hunsaker, D. and R. Moreland, March 1981, "Compilation of a Biogenic Hydrocarbon Emissions Inventory for the Evaluation of Ozone Control Strategies in the San Francisco Bay Area," Air Quality Technical Memorandum 35, Association of Bay Area Governments.

Kalmaz, E.V., et al., August 1980, "Effect of Long-Term Low and Moderate Levels of CO Exposure on Platelet Counts of Rabbits," J. Env. Path. Toxic. 4(1): 351-8, 1980.

Kan, I., January 1982, "Methodology for Projecting Future Carbon Monoxide Levels and Estimating Control Measure Effectiveness in the 1982 Plan," Air Quality Technical Memorandum 43, Association of Bay Area Governments.

Kan, I., May 1982, "Effectiveness and Costs of Alternative Air Quality Control Measures for Attaining the Federal Ozone Standard," Air Quality Technical Memorandum 46, Association of Bay Area Governments.

Knudson, B., "Truck Travel in the San Francisco Region," memorandum as revised February 4, 1981, Metropolitan Transportation Commission.

Ostro, B. D., 1980, "Air Pollution, Public Health and Inflation," Env. Health Persp. 34: 185-189, 1980.

Perardi, et al., January 1982, "Results of the 1980/81 Hotspot Monitoring Program for Carbon Monoxide," Air Quality Technical Memorandum 40, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Sandberg, J., et al., May 1980, "Air Quality Status Report: 1979," Air Quality Technical Memorandum 32, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Sandberg, J., et al., August 1981, "Air Quality Status Report: 1980," Air Quality Technical Memorandum 37, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

SRI International, May 1981, Measuring the Benefits of Air Quality Improvements in the San Francisco Bay Area, SRI International, 333 Ravenswood Avenue, Menlo Park, California 94025.

U.S. Department of Transportation, "The Costs and Effectiveness of Transportation Control Measures in Achieving Air Quality Goals," Office of Environment and Safety, Office of the Secretary of Transportation, Washington, DC, August 1981.

U.S. Environmental Protection Agency, March 1978, "Mobile Source Emission Factors," final document, Office of Air and Waste Management, Washington, D.C., 20460, EPA-400/9-78-005.

U.S. Environmental Protection Agency, 1978a, Air Quality Criteria for Ozone and Other Photochemical Oxidants (Preprint), EPA-600/8-78-004, April 1978.

U.S. Environmental Protection Agency, 1978b, Summary Statement from the EPA Advisory Panel on Health Effects of Photochemical Oxidants, report for EPA by the Institute for Environmental Studies of the University of N. Carolina at Chapel Hill, January 1978.

U.S. Environmental Protection Agency, 1978c, Assessment of Welfare Effects and the Secondary Air Quality Standard for Ozone, EPA-OAQPS-78-8, January 1978.

U.S. Environmental Protection Agency, 1979, Air Quality Criteria for Carbon Monoxide (Preprint), EPA-600/8-79-022, October 1979.

U.S. Environmental Protection Agency, 1981, Health Effects of Carbon Monoxide and Ozone, EPA-AA-IMS/81-8, July 1981.

Wada, R. and Kan, I., August 1977, "Baseline Motor Vehicle Emission Inventory: Methodology and Results," Air Quality Technical Memorandum 12, Association of Bay Area Governments.

Wada, R., September 1978, "Carbon Monoxide in the San Francisco Bay Area: The Problem and Approaches to CO Plan Development," Air Quality Technical Memorandum 26, Association of Bay Area Governments.

Wada, R., et al., May 1981, "Present and Projected Emissions in the San Francisco Bay Area 1979-1987," Air Quality Technical Memorandum 36, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Wada, R., and Rothenberg, M., September 1981, "Resource Recovery and Cogeneration Projects in the 1982 Plan," Air Quality Technical Memorandum 38, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Wong, J., November 1979, "Summary of 1978-79 Pilot CO Hotspot Monitoring Program," Air Quality Technical Memorandum 27, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

Wong, M.J., September 1980, "Indirect Source Review," Air Quality Issue Paper 6, Association of Bay Area Governments, Bay Area Air Quality Management District, Metropolitan Transportation Commission.

APPENDIX A
STATIONARY SOURCE CONTROL MEASURES

1 July 1982

SUMMARY OF PROPOSED STATIONARY SOURCE CONTROL MEASURES

1. **Organic Chemical Manufacturing:** New rule requiring control of volatile organic compound (VOC) fugitive emissions from pumps, compressors, process vessel depressurization and process relief valves. Limits would be similar to existing limits for petroleum refining plants.
2. **General Solvent and Surface Coating Operations:** Modify Regulation 8 - Rule 4 by lowering hourly and daily VOC emission limits.
3. **Letterpress/Offset Printing:** Modify Regulation 8 - Rule 20 by deleting letterpress/offset exemption and adding specific VOC emission limits.
4. **Natural Gas and Crude Oil Production & Processing:** New rule requiring control of VOC fugitive emissions from valves, flanges, pumps, compressors, relief valves, and storage tanks. Limits would be similar to existing limits for petroleum refining plants.
5. **Polymer and Resins Manufacturing:** New rule requiring control of VOC emissions from reactor vessels, etc. by condensation, adsorption.
6. **Wood Furniture Coating:** New rule requiring 50% reduction of VOC through the use of low solvent coatings and high transfer efficiency spray methods.
7. **Volatile Organic Waste Disposal:** New rule requiring stripping and recovery of VOC from wastes prior to disposal.
8. **Aerosol Cans:** New rule banning the use of VOC propellants. Substitute pump, stick, roll-on containers or use N_2/CO_2 propellants.
9. **Marine Lightering:** New rule requiring use of deep draft lighter vessels to reduce lightering emissions.
10. **Ship, Barge, Tanker and Railcar Loading:** New rule(s) requiring 90 to 95% control of VOC emissions by vapor balance, condensation, etc.
11. **Gasoline Distribution:** Modify Regulation 8 - Rule 6 and Rule 7 by lowering exemption cut-offs to require Phase I and Phase II controls at additional service stations.
12. **Architectural Coatings:** Modify Regulation 8 - Rule 3 by lowering the VOC content limit for flat coatings from 250 to 125 grams per liter.
13. **VOC Storage:** Modify Regulation 8 - Rule 5 by lowering control requirement cut-offs from 1.5 psia and 40,000 gallons to 0.5 psia and/or 10,000 gallons.

14. **Automobile Refinishing:** New rule requiring 50% reduction of VOC emissions by lowering VOC content of automobile refinishing coatings.
15. **Pesticides:** New rule banning the use of weed oil, requiring the use of water or other non-VOC carriers and limiting overspray.
16. **Wineries:** New rule requiring control of VOC emissions during fermentation by condensation, absorption, etc.
17. **Coatings Manufacturing:** New rule requiring control of VOC emissions from reactors, blenders, mixers, and transfer and storage. Requirements would be similar to existing requirements for pharmaceutical products in Regulation 8 - Rule 24.
18. **Lawnmowers:** New rule banning the sale of two-cycle lawnmowers and limiting hydrocarbon emissions from new four-cycle engines.
19. **Reciprocating Engines** (gasoline/gas fuel): New rule requiring reduction of hydrocarbon emissions from reciprocating engines. Replace two-cycle engines with four-cycle; replace four-cycle engines with electric motors where possible.
20. **Farm Tractors** (gasoline fuel): New rule requiring control of hydrocarbon emissions from new gasoline engine tractors.
21. **Construction Equipment** (diesel): New rule requiring control of hydrocarbon emissions from new and existing equipment.
22. **Vegetable Oil Manufacturing:** New rule requiring control of VOC emissions from extractors, desolventizers, dryers, coolers and conveyors by a mineral oil scrubber and proper maintenance and operation per draft EPA CTG.
23. **Aerospace Assembly and Coating Operations:** Regulation 8 - Rule 29 is being developed, with an independent workshop schedule.
24. **Rubber/Plastic Products Manufacturing:** New rule requiring control of VOC emissions from molding, curing, cementing, etc by condensation, adsorption or incineration.
25. **Pleasure Boats** (gasoline and diesel fuel): New rule requiring hydrocarbon controls on new engines.
26. **Marine Lightering Retrofit:** New rule requiring 90 to 95% control of VOC emissions by vapor balance, condensation, etc.
27. **Off-Road Motorcycles** (gasoline two-cycle): New rule banning the sale of new two-cycle engines in favor of four-cycle.
28. **Industrial Maintenance Coatings:** New rule requiring the use of low solvent coatings for some industrial maintenance applications.

29. **Sanitary Landfill Sites:** New rule requiring the installation of gas collection systems. Gas would be combusted directly or separated into a saleable methane portion and a non-methane portion, to be incinerated.
30. **Marine Vessel Gas-Freeing:** New rule would require gas freeing be conducted outside District waters with exceptions for safety considerations, etc.
31. **Tanker Ballasting:** The Coast Guard has adopted a Rule requiring segregated ballast or a washed ballast tank and an inert gas system for tankers larger than 40,000 DWT.
32. **New Electronics Industry Regulation:** New rule would require control of significant solvent emitting sources by condensation, adsorption, etc.
33. **Coating of Plastics:** New rule would require control of VOC emissions by the use of low-solvent coatings or equivalent control by condensation, adsorption, incineration, etc.
34. **Pleasure Boat Fueling (gasoline):** Modify Regulation 8 - Rule 7 to require control of VOC emissions from pleasure boat fueling with vapor recovery systems.
35. **New Source Review:** Modify the Regulation 2 - Rule 2 to increase the on-site offset ratio for VOC from 1.0:1 to 1.1:1 or 1.2:1 on an annual average basis.
36. **Ozone from Irradiation Beams:** New rule requiring control of directly emitted ozone by scrubbers, etc.
37. **Tree Replacement:** New rule requiring the replacement of 10% of high VOC emitting species with low emitting native species.
38. **Large Commercial Bakeries:** New rule requiring control of oven VOC emissions from large commercial bakeries.
39. **Develop and Tighten Plant Emission Limits:** New rule requiring 10% reduction of current allowable organic emissions for plants emitting more than 100 tons of organics per year.
40. **Airport Fuel Transfer (gasoline):** New rule requiring control of VOC emissions from fuel transfer by the use of vapor balance systems.
41. **New Service Stations:** Modify Regulation 8 - Rule 7 to require the use of secondary assist vapor recovery systems for vehicle fueling at new service stations.
42. **Zero Gap Seals for Floating Roof Tanks:** Modify Regulation 8 - Rule 5 to require installation of "zero gap" seals on most floating roof tanks.

PROPOSED CONTROL MEASURE - # 1

CONTROL MEASURE NAME: **Organic Chemical Manufacturing**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	Tons/Day
#19 Other Chemical Mfgr.	0.8	0.6	
Current Estimate			
Subject to Control	0.5	0.5	
Potential Reduction	--	0.3	

COST EFFECTIVENESS: **\$500/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	Tons/Day
Reduction	0	0.2	0.3	0.3	0.3	0.3	

DESCRIPTION OF CONTROL MEASURE:

Fugitive emissions from organic chemical manufacturing plant valves and flanges are presently regulated by Regulation 8 Rule #22. This Rule will affect approximately 10 chemical plants with a total of 2,000 sources which must meet a leak detection and repair program (quarterly monitoring) with an action level of 10,000 ppm (expressed as methane). These sources are primarily process vessel depressuring, pressure relief valve leaks, compressor seal leaks and pump seal leaks.

PROBABLE METHOD OF CONTROL:

Install vapor recovery plant for process vessel vents and easily manifolded relief valve vents or an alternative of manifolding all vents to an existing furnace (or incinerator) or flaring. Install rupture disks in place of relief valves, or upstream of relief valves; use pilot-operated relief valves to reduce leakage. Use continuous surveillance (temperature, infrared, etc.) to detect leaks. Pump seals will be retrofitted with dual seals (with barrier fluid and degassing systems). Compressor seals will be retrofitted for degassing vents to the compressor.

OTHER IMPACTS:

Increased energy use if incineration used.

P R O P O S E D C O N T R O L M E A S U R E # 2

CONTROL MEASURE NAME: **General Solvent and Surface Coating Operations**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#61 Industrial Coating-Hi Solv.	73.7	15.3	Tons/Day
#62 Lo Solv.	1.5	26	
Current Estimate	"	"	
Subject to Control	--	--	
Potential Reduction	--	1.5	

COST EFFECTIVENESS: **\$6,000/ton**

REACTIVITY: **varies, generally high**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	0	0	1	1.5	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

The control measure would affect major source operations that emit greater than 600 lbs/day of precursor organic compounds. Proposed measure will set an emissions cap for major sources. This emission cap will vary according to source operation: 3000 lb/day and 450 lb/hr for sources subject to Rule 13, 1320 lb/day and 220 lb/hr for aerospace operations, 600 lb/day and 81 lb/hr for all other sources. Proposed measure will affect all source operations covered by existing rules. Affected sources are principally general painting operations plus auto lines and film coaters.

PROBABLE METHOD OF CONTROL:

Measure will require reformulation of coating materials by the coating manufacture industry. Where industry is currently using low solvent coatings incinerators may be required.

OTHER IMPACTS:

Increased energy use if incineration required.

P R O P O S E D C O N T R O L M E A S U R E # 3

CONTROL MEASURE NAME: **Letterpress/Offset Printing**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#77 Other Printing	<u>6.4</u>	<u>5.7</u>	Tons/Day
Current Estimate	"	"	
Subject to Control	--	5.0	
Potential Reduction	--	3.0	

COST EFFECTIVENESS: **\$1800/ton**

REACTIVITY: **high**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	--	2.4	2.5	2.7	2.9	3.0	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

This rule will affect approximately 100 locations and 400 sources of letterpress and offset printing operations within the District. This rule will be similar to existing rules governing other types of printing operations (i.e. rotogravure, flexograph).

PROBABLE METHOD OF CONTROL:

1. Refrigeration/Condensation: involves the chilling of the air and condensing the organic out. An uneconomical option due to the large volume of air that would have to be chilled; system would have to be large and therefore, expensive.
2. Carbon Adsorption: involves passing the air from the presses through carbon beds that would remove the organics. An uneconomical option due to the many carbon beds that would be required to handle the large air volumes and the subsequent regeneration of this carbon on a frequent basis.
3. Incineration: involves passing the air through a high temperature incinerator, or a catalyst. Most economical option because incinerators easily handle large volumes of air. Ducting the air to the incinerator can be achieved in one of two ways: 1) hooding each press and sucking the air up into a ducting system, or 2) floor scoops that would direct the heavier, solvent vapor laden air to a ducting sytem that leads to an incinerator.

OTHER IMPACTS:

Increased energy use.

P R O P O S E D C O N T R O L M E A S U R E # 4

CONTROL MEASURE NAME: **Natural Gas and Crude Oil Production & Processing**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#40 Oil & Gas Field Operations	<u>2.3</u>	<u>2.5</u>	Tons/Day
Current Estimate	"	"	
Subject to Control	2.3	2.5	
Potential Reduction	--	1.6	

COST EFFECTIVENESS: **\$750/ton** (non-Methane-Hydrocarbon)

REACTIVITY: **low**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	--	1.6	1.6	1.6	1.6	1.6	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

This Rule will affect approximately twenty locations and 1,000 sources of gas/crude oil process/production operations in Solano, Contra Costa and Alameda Counties. The Rule will be similar to refinery rules that control fugitive emissions, process vessels and storage tanks. Fugitive emission sources must meet a leak detection and repair program (quarterly monitoring) with an action level of 10,000 ppm (expressed as methane). These sources are process vessel depressuring, pressure relief valve leaks, compressor seal leaks and pump seal leaks. A few organic storage tank greater than or equal to 37.5 m³ (10,000 gals.) will require organic emission control of 95% by weight.

PROBABLE METHOD OF CONTROL:

Install vapor recovery plant for process vessel vents and easily manifolded relief valve vents or an alternative of venting emission to a certified flare or incinerator. Pump seals will be retrofitted with dual seals (barrier fluid & degassing system). Compressor seals will be retrofitted for degassing vents to the compressor. All storage tanks greater than or equal to 27.5M³ (10,000 gals.) and greater than or equal to 0.33 BAR (0.5 psia) will require floating roof & two seals or vapor recovery of 95% by weight or any alternative that can be proved to meet 95% (wt.) control.

OTHER IMPACTS:

P R O P O S E D C O N T R O L M E A S U R E # 5

CONTROL MEASURE NAME: **Polymer and Resin Manufacturing**

EMISSION ESTIMATES:

	<u>1979</u>	<u>1987</u>	
BAAQMD Inventory:	<u>0.8</u>	<u>0.6</u>	Tons/Day
#19 Other Chem. Mfgr.	1.2	1	
57 Storage Tanks-Solv.	1.8	2	
58 Storage Tanks-Other	<u>0.7</u>	<u>0.7</u>	
66 Coatings Mfgr.	<u>4.5</u>	<u>4.3</u>	
Total	"	"	
Current Estimate	0.5	0.5	
Subject to Control		0.2	
Potential Reduction			

COST EFFECTIVENESS: **\$1600/ton**

REACTIVITY: **medium**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction			0.1	0.1	0.2	0.2	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

With the exception of fugitive emissions, much of the control equipment used in this industry is a basic part of the system and serves to recover a reactant or product. These controls include floating roof tanks or vapor recovery systems on volatile material, storage units, adsorption or condensers, purge lines that vent to a flare system, and recovery systems on vacuum exhaust lines. Fugitive emissions such as process vessel depressuring, pressure relief valve--compressor seal and pump seal leaks must meet a leak detection and repair program (quarterly monitoring) with an action level of 10,000 ppm (expressed as methane). Approximately 25 locations with approx. 70 sources will be affected by this rule.

PROBABLE METHOD OF CONTROL:

Storage tanks of greater than or equal to 37.5 m³ (10,000 gals) and greater than or equal to 0.033 bar (0.5 psia) will require floating roof and two seals or vapor recovery of 95% by weight or any alternative that can be allowed to meet 95% (wt.) control of organic emissions. Install vapor recovery units for process vessel vents and easily manifolded relief valves or an alternative of venting emission to a certified flare or incinerator. Pump seals will be retrofitted with dual seals (barrier fluid and degassing systems). Compressor seals will be retrofitted for degassing vents to the compressor. Truck loading racks and drum filling station vent emissions should be 95% (wt.) controlled by carbon adsorber, direct flame afterburner or flared. Exempt any process vent that emits smaller than or equal to 5 kg (11 lbs.) of organic material per day.

OTHER IMPACTS:

Increased energy use if incineration is used.

P R O P O S E D C O N T R O L M E A S U R E - # 6

CONTROL MEASURE NAME: **Wood Furniture Coating**

EMISSION ESTIMATES:

BAAQMD Inventory:	1979	1987	
#61 Industrial Coating	<u>72.0</u>	<u>15.3</u>	Tons/Day
Current Estimate	73.7	15.3	
Subject to Control	2.0	2.2	
Potential Reduction	--	1.1	

COST EFFECTIVENESS: **\$500/ton**

REACTIVITY: **medium**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction			1.1	1.1	1.1	1.1	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

This measure is intended to reduce the VOC emissions from furniture coating operations by at least 50%. About five major companies with approximately 25 sources would be affected. Small business with emissions less than 20 lb/day would be exempt.

PROBABLE METHOD OF CONTROL:

Three methods of reducing VOC emissions from wood furniture coating operations are:

- Electrostatic spraying employing high voltage to electrically charge atomized material leaving spray gun, and wood surface made conductive so that it can be grounded.
- Waterborne coatings using binder or resin that is miscible in a water & organic solvent mixture.
- Combustion of VOC emissions in an incinerator may not be practical from an energy and equipment cost considerations.

Waterborne coatings will be substituted for low to medium solvent coatings. Higher solvent coatings would require 50 to 60% transfer ratios--(electrostatic spraying can also improve transfer efficiencies). Halogenated solvents could be substituted for more reactive solvents presently used.

OTHER IMPACTS:

Possible water pollution from water borne coatings.
Increased energy use if incineration used.

PROPOSED CONTROL MEASURE - # 7

CONTROL MEASURE NAME: **Volatile Organic Waste Disposal**

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:	<u>5.7</u>	<u>4</u>	Tons/Day
#11 Other Processes	3	3	
#42 Land Farming	2.7	3	
#44 Other Industrial/Commercial	14.7	10.9	
#81 Other Organics Evaporation	26.1	20.9	
Total	"	"	
Current Estimate	8	8	
Subject to Control	--	6	
Potential Reduction			

COST EFFECTIVENESS: **unknown**

REACTIVITY: **variable**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	0	2	6	6	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

This measure would apply to any person who generates, stores, transfers, treats or disposes of volatile organic wastes. It would prohibit mixing wastes in such a manner that would render the waste unsuitable for recycling or recovery, require the waste to be stored in covered containers, and require submerged filling or bottom loading during transfer operations. It would prohibit ponding or land spreading of wastes containing greater than 1% VOC as defined by a vapor pressure or distillation test. It would also require persons generating more than 2000 kilograms/month to have a District approved volatile organic waste control plan.

PROBABLE METHOD OF CONTROL:

This measure would encourage recycling and recovery of waste solvents, thus minimizing quantities disposed of in Class I dump sites. Class I sites would have to pretreat wastes with greater than 1% volatile organic wastes before the waste could be disposed of in ponds or by other land disposal methods. Some wastes might be transported outside the District and/or incinerated.

OTHER IMPACTS:

Use of incineration would result in increased energy consumption, and would produce additional emissions of NOx, SOx, and particulate matter.

COMMENTS:

No demonstrated alternative for treating 3-phase oily wastes. State of California and U.S. EPA have been involved in hazardous waste regulation. State proposed limits are 50% volatiles in 1983, 10% in January 1984 and 1% in June 1984.

PROPOSED CONTROL MEASURE - # 8

CONTROL MEASURE NAME: **Aerosol Cans**

EMISSION ESTIMATES:

BAAQMD Inventory:	1979	1987	
#80 Consumer Solvent Usage	41.7	45.3	Tons/Day
#36 Pesticides	8.5	9.2	
Current Estimate	"	"	
Subject to Control	9	9	
Potential Reduction	--	3	

COST EFFECTIVENESS: **\$550/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	0	0	1	2	3	3	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Control measure would affect only that portion of consumer solvent emissions resulting from the use of hydrocarbon (isobutane, etc.) propellants and solvents in aerosol spray cans. This would require limiting hydrocarbon content of aerosol products, with exemptions for certain applications such as medical products, enamel paint sprays, hair sprays, containers less than one ounce, etc.

PROBABLE METHOD OF CONTROL:

Convert to pump-type, stick or roll-on containers. Use CO₂ or N₂ as propellants for applications requiring aerosol sprays. Reformulate to reduce use of VOC diluents, carriers, and propellants.

OTHER IMPACTS:

Manufacturers may not be able to design products just for Bay Area or California markets. Some products would be unavailable; decreased consumer choice.

COMMENTS:

Some aerosol products cannot use a waterbase formulation; hydrocarbon component serves as diluent, carrier, and propellant. Changing propellant would require addition of some other organic solvent.

P R O P O S E D C O N T R O L M E A S U R E # 9

CONTROL MEASURE NAME: **Marine Lightering**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#79 Lightering, Marine Transfer	4.5	4.1	Tons/Day
Current Estimate	7	7	
Subject to Control		4	
Potential Reduction		0.6	

COST EFFECTIVENESS: **\$1000/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	0.6	0.6	0.6	0.6	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Require the use of deep draft vessels or barges and high final ullage and/or a low arrival VOC concentration when lightering. Proposed measure will reduce lightering emissions from shallow barge lightering by 41%. No air pollution abatement technology is associated with this proposed control measure.

PROBABLE METHOD OF CONTROL:

Large tankers transporting crude oil sometimes find it necessary to offload part or all of their cargo into smaller vessels because of draft restrictions. Emissions from lightering into deep draft barges or vessels are less than emissions from lightering into shallow draft barges. Much of the lightering in the Bay is done into shallow draft vessels. These emissions may be reduced by using deep draft barges greater than 40 feet tank depth or small tankers when lightering. Current API calculation procedures indicate lower lightering emissions from deep draft vessels compared to shallow vessels. This control measure will require the use of deep draft barges which will provide a large final ullage in order to reduce emissions during lightering. Numbers on allowable tank depth, final ullage, or arrival VOC concentration will be determined during rule development.

OTHER IMPACTS:

The control measure may require the acquisition of more deep draft barges for use in the bay as lighters, although a sufficient number barges may be available for rent.

PROPOSED CONTROL MEASURE # 10

CONTROL MEASURE NAME: Ship, Barge, Tanker & Railcar Loading

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#48 Loading	3.1	3.5	Tons/Day
Current Estimate			
Subject to Control			
Potential Reduction		3	

COST EFFECTIVENESS: \$2-7000/ton

REACTIVITY: medium

YEAR OF ADOPTION: 1984

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	0	1	2	3	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Require 90% control of loading emissions. Low volume and low vapor pressure loading may be exempted.

PROBABLE METHOD OF CONTROL:

Condensation, vapor balance, incineration technology similar to the loading of gasoline trucks at bulk terminals.

OTHER IMPACTS:

Safety considerations are important. Other agencies, such as Coast Guard, may have jurisdiction.

COMMENTS:

Control of railcar loading emissions costs about \$10,000/ton. EPA dismissed proposals to control tank car loading because only 1 car in 10 carried VOC liquids on previous load. Operators who do not have dedicated fleet may not be able to comply with marine control requirements.

PROPOSED CONTROL MEASURE # 1 1

CONTROL MEASURE NAME: **Gasoline Distribution**

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:			
#54 Filling Station Storage Tank	6	5.1	Tons/Day
#55 Filling Sta. Vehicle Tank	6.4	5.5	
Total	12.4	10.6	
Subject to Control		1.1	
Potential Reduction		1.0	

COST EFFECTIVENESS: **\$500/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	0	0	0	1	1	1	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Regulation 8 Rule 6-111 will be more stringent, effective 1/1/83, to reduce the number of exempted trucks and bulk plants. This measure would modify 8-7-110.5 to require vapor recovery equipment at retail service stations previously exempted because they were serviced exclusively by bulk plants with a throughput below 6 million gallons per year.

PROBABLE METHOD OF CONTROL:

Installation of vapor balance systems on 112 stations now claiming exemptions.

OTHER IMPACTS:

Capital cost requirements may be burdensome on small station operators.

P R O P O S E D C O N T R O L M E A S U R E - # 1 2

CONTROL MEASURE NAME: **Architectural Coatings**

EMISSION ESTIMATES:

BAAQMD Inventory:	1979	1987	
#60 Structures Coating-Low Solv.	14.4*	24*	Tons/Day
Current Estimate	"	"	
Subject to Control		10	
Potential Reduction		1**	

COST EFFECTIVENESS: **\$1500/ton**

REACTIVITY: **medium**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	0	0	4.5	4.5	4.5	4.5	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Control measure would reduce the solvent content limit for flat coatings from 250 grams per liter to 125 grams per liter in Regulation 8 - Rule 3. Possible exemption for certain types of paint.

PROBABLE METHOD OF CONTROL:

Most reduction of organic emissions will be by substituting latex-type coatings for low solvent flat paints. The remaining reductions will be achieved by reformulation of low solvent flat paints from 250 to 125 grams per liter.

OTHER IMPACTS:

*Inventory based on 0.5 lb solvent per gallon. Usage rate based on BAAQMD survey (1976). South Coast/ARB survey found use rate substantially lower, update in process.

**Potential reduction is small because present float paints average about 135 grams/liter.

PROPOSED CONTROL MEASURE # 13

CONTROL MEASURE NAME: VOC Storage

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:			
#47 Refinery Storage & Blending	12.2	12.5	Tons/Day
#50 Bulk Plant Storage	1.5	.9	
#57 Solvent	1.2	1.0	
#58 Other Organics	1.8	2.0	
Total	16.7	16.4	
Subject to Control		12	
Potential Reduction		3	

COST EFFECTIVENESS: \$275-1500/ton

REACTIVITY: varies

YEAR OF ADOPTION: 1983

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	0	.2	.5	.7	1.5	3	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

The control measure would affect tanks larger than 40,000 gallons that contain a stock cut between 0.5 psia and 1.5 psia and tanks larger than 10,000 gallons containing stock greater than 1.5 psia. The first grouping would primarily impact tanks at refineries. The second grouping would have impact at marketing bulk plants and organic solvent storage facilities. There are few refinery tanks in the second category.

PROBABLE METHOD OF CONTROL:

The use of secondary seals on larger tanks would be the most effective and economical means on FR tanks. On cone roof tanks an internal floating roof would be the most economical means unless a vapor recovery system was already in place.

OTHER IMPACTS:

Installation of internal roof requires tank cleaning and disposal of hazardous bottoms.

COMMENTS:

Cost of control on small tanks (10,000 to 40,000 gal.) is much higher, about \$4,000/ton reduction.

P R O P O S E D C O N T R O L M E A S U R E # 1 4

CONTROL MEASURE NAME: **Automobile Refinishing**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#63 Other Coating-High Solvent	<u>19</u>	<u>20</u>	Tons/Day
Current Estimate	19	20	
Subject to Control	--	13	
Potential Reduction	--	5.2	

COST EFFECTIVENESS: **\$2,800/ton**

REACTIVITY: **medium**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	5.2	5.2	5.2	5.2	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Automobile refinishing of worn or damaged autos, light trucks and other vehicles using lacquers and enamels sprayed in paint booths or simply spray guns in the open. This Rule will require enclosure of painting area, lower solvent lacquers and enamels and/or alternater control methods to achieve 50 to 90% emission control on the effluent stream.

PROBABLE METHOD OF CONTROL:

Install totally enclosed paint spray booths equipped with paint arresters, water curtains and/or incineration/adsorption/electrostatic control systems to obtain 90% emission control of non-methane hydrocarbons on sources emitting greater than or equal to 15 Lb/day of total organic compoiunds. Sources (spray guns) greater than or equal to 15 Lb/day will require use of low solvent lacquers and enamels at greater than or equal to 350 grams of VOC per liter of coating. Overall control, as shown above, is expected to be about 40%.

OTHER IMPACTS:

Low solvent paint may be less durable.

P R O P O S E D C O N T R O L M E A S U R E - # 1 5

CONTROL MEASURE NAME: **Pesticides**

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:	8.4	9.2	Tons/Day
#36 Pesticides	"	"	
Current Estimate		5.6	
Subject to Control		3.7	
Potential Reduction			

COST EFFECTIVENESS: **\$400/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	0	0	1	1.8	3.3	3.7	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

New regulation to encourage use of existing synthetic pesticides; discourage or prohibit non-synthetic. Also ban the use of weed oil.

PROBABLE METHOD OF CONTROL:

Reformulation of existing products to synthetic pesticides.
Eliminate the use of weed oil.

OTHER IMPACTS:

ARB has created a task force to study control measure on the use of pesticides. Reformulation of existing non-synthetic pesticides can result in synthetic pesticides that may be more hazardous than the reactive organic they replace. A report will be available in mid-1982. Encouraging the use of existing synthetic pesticides in place of non-synthetic pesticides will not reduce total organic emissions but will reduce the amount of reactive organic emissions into the atmosphere. Other responses from Agricultural industries are forthcoming. Calif. Admin. Code (Title 3, Section 2445) requires county agricultural commissioners to consult with agencies having jurisdiction over resources affected by pesticide use.

COMMENTS:

Emissions estimate may be too high because underlying studies (Eureka Lab & Weins Report) have been challenged. Possibly as little as 15% of applied VOC carrier evaporates to air.

P R O P O S E D C O N T R O L M E A S U R E - # 1 6

CONTROL MEASURE NAME: **Wineries**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#33 Wineries	0.3	0.3	Tons/Day
Current Estimate	"	"	
Subject to Control		0.2	
Potential Reduction		0.1	

COST EFFECTIVENESS: **\$2000/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1985**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	0	0	0.1	0.1	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Control measure would affect ethanol emissions resulting from the fermentation process. Control requirements should be focused on the larger operations and/or tanks, with exemptions based on size.

PROBABLE METHOD OF CONTROL:

Due to the nature of the process, the volume of effluent gases to be processed should be relatively small. Large tanks could be manifolded together and ducted to a single control system, employing condensation or absorbtion.

OTHER IMPACTS:

COMMENTS:

Wineries are currently exempt from permit requirements. Because of the low emissions, low reactivity, and the remote location of most wineries, this measure is unlikely to offer much potential for ozone reduction. ARB has contracted EAL Research Lab. to do literature and field studies; report expected soon.

P R O P O S E D C O N T R O L M E A S U R E - # 1 7

CONTROL MEASURE NAME: **Coatings Manufacturing**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#66 Coatings Manufacture	<u>0.7</u>	<u>0.7</u>	Tons/Day
Current Estimate	"	"	
Subject to Control		0.7	
Potential Reduction		0.2	

COST EFFECTIVENESS: **\$2000/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	<u>0</u>	<u>0.1</u>	<u>0.2</u>	<u>0.2</u>	<u>0.2</u>	<u>0.2</u>	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Require 95% control, by weight, of organic emissions from tanks, process vessel vents 5 kg (11 lbs.) per day, relief valves, truck and drum filling, and vacuum exhaust. Decrease fugitive emissions by improved vigilance and maintenance. Fugitive emissions such as process vessel depressuring, pressure relief valves, compressor seal and pump seal leaks must meet a leak detection and repair program (quarterly monitoring) with an action level of 10,000 ppm (expressed as methane). Approximately 20 locations with a total of 60 sources would be affected by this rule.

PROBABLE METHOD OF CONTROL:

Much of the control equipment used in this industry is a basic part of the process and serves to recover a reactant or product. These controls include floating roof tanks or vapor recovery systems on volatile material storage units, adsorption or condensers, purge lines that vent to a flare system, and recovery systems on vacuum exhaust lines. Storage tanks greater than or equal to 37.5 m³ (10,000 gallons) containing organic liquid greater than or equal to 0.033 bar (0.5 psia) will require double seal floating roofs or vapor recovery or any alternate that can be shown to meet 95 wt.% control of organic emissions. Install vapor recovery units for process vessel vents, truck loading and drum filling stations, and easily manifolded relief valves or an alternate of venting emissions to a certified flare or incinerator at 95 wt.% control. Pump seals will be retrofitted with dual seals (barrier fluid and degassing systems). Compressor seals will be retrofitted for degassing vents to the compressor.

OTHER IMPACTS:

P R O P O S E D C O N T R O L M E A S U R E - # 1 8

CONTROL MEASURE NAME: **Lawnmowers**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#104 Recip. Eng., Lawnmowers	<u>5.6</u>	<u>4.2</u>	Tons/Day
Current Estimate			
Subject to Control	1.5	0.3	
Potential Reduction		0.1*	

COST EFFECTIVENESS: **little or no cost to consumer; use \$200/ton**

REACTIVITY: **high**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	<u>0</u>	<u>0</u>				<u>0.1</u>	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Ban the sale of new 2-stroke gasoline engine lawnmowers as of January 1, 1984. All mowers sold after that date would have to be electric, 4-stroke gasoline, or push-type. Require fixed (instead of variable) main jet on new 4-stroke engines.

PROBABLE METHOD OF CONTROL:

Replacement of high-emitting 2-stroke mowers with low-emitting models. Emissions from existing 2-stroke mowers will be reduced as the older mowers wear out and are subsequently replaced by either electric or 4-strokes. This replacement is occurring now, without regulation, and any new control measure will have a small effect on emissions. About 5% of existing mowers have 2-stroke engines. Most new units are electric or 4-stroke. Organic emissions from one 2-stroke are equal to emissions from eight 4-strokes. Thus replacement of each 2 stroke will reduce that emission by more than 88%.

OTHER IMPACTS:

ARB responsibility for hardware controls on 4-stroke engines, for reasons of precedent, expertise and statewide uniformity.

ALTERNATIVE CONTROL MEASURE #18-B: ***** NOT REASONABLY AVAILABLE *****

Ban use of gasoline-powered mowers on ozone days of high ozone potential; 8 T/Day reduction.

*Note that summer day emission reductions would be approximately twice the annual average daily reductions.

P R O P O S E D C O N T R O L M E A S U R E - # 1 9

CONTROL MEASURE NAME: **Reciprocating Engines** (Gasoline/Gas/Oil-Fueled)

EMISSION ESTIMATES:

	<u>1979</u>	<u>1987</u>	
BAAQMD Inventory:	<u>11.4</u>	<u>13.2</u>	Tons/Day
#105 Other Gasoline Engines	3.3	3.4	
#106 Gas Fueled Engines	0.1	0.1	
#107 Oil Fueled Engines	14.8	16.7	
Cumulative Total	14.7	16.6	
Subject to Control		4.0	
Potential Reduction			

COST EFFECTIVENESS: **\$200/ton**

REACTIVITY: **high**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	0.2	0.4	0.8	4.0	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Ban the sale of most new two stroke reciprocating engines. Limit the organic emissions from new 4-stroke engines using current technology in the short term; eventually replace these engines with electric powered units. Discourage/prohibit the sale of new gasoline powered engines at some future date.

PROBABLE METHOD OF CONTROL:

This control measure would primarily affect emissions from 2-stroke and 4-stroke gasoline-powered reciprocating engines, and gas-fuel units. There would be no effect on emissions resulting from the use of oil-fueled engines. Reductions will be achieved by banning the sale of most new 2-stroke engines, and controlling the emissions from new 4-stroke gasoline-powered engines. These controls account for 95% of the total expected reduction in organics. Equipment subject to this ban/control include lawn and garden equipment and some home utility engines, with exceptions for light hand-held units. All affected new units sold after the date of adoption would need to be either electric or low-emission 4-stroke (lean burn, fixed main jet, etc.). A small reduction in organic emissions would be accomplished by requiring refineries and chemical companies to replace their gas-fuel engines with electric-powered units. Since oil-fueled engines are used primarily as stand-by electric generating units, it is not possible to replace these engines with electric motors.

OTHER IMPACTS:

P R O P O S E D C O N T R O L M E A S U R E - # 2 0

NOT REASONABLY AVAILABLE

CONTROL MEASURE NAME: **Gasoline Farm Tractors**

EMISSION ESTIMATES:

BAAQMD Inventory:	1979	1987	
#123 Farm Tractors - Gasoline	0.6	0.4	Tons/Day
Current Estimate	"	"	
Subject to Control		0.2	
Potential Reduction		0.1	

COST EFFECTIVENESS: **\$400/ton**

REACTIVITY: **high**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	0	0	0.05	0.1	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Control measure would affect new gasoline engine tractors by requiring exhaust hydrocarbon emission controls similar to those currently employed on highway motor vehicles.

PROBABLE METHOD OF CONTROL:

Control methods include engine and carburetor modifications and installation of air pumps and/or catalytic converters.

COMMENTS:

Difficult or impossible to control farm equipment because they are not registered or licensed by DMV. High costs required to enforce this measure probably not justified for small potential emission reduction in rural areas.

PROPOSED CONTROL MEASURE - # 2 1

NOT REASONABLY AVAILABLE

CONTROL MEASURE NAME: Diesel Construction Equipment

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:	<u>5.2</u>	<u>5.8</u>	Tons/Day
#126 Constr. Equip. - Diesel	"	"	
Current Estimate		5.8	
Subject to Control		1.5	
Potential Reduction			

COST EFFECTIVENESS: \$4000/ton

REACTIVITY: medium

YEAR OF ADOPTION: 1985

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	<u>0</u>	<u>0</u>	<u>0</u>	<u>0.3</u>	<u>1.0</u>	<u>1.5</u>	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Control measure would affect new and existing diesel construction equipment by requiring an annual maintenance program.

PROBABLE METHOD OF CONTROL:

Injection rate, timing, and spray pattern would be set to manufacturer's specifications. Annual maintenance could result in some cost savings through fuel savings.

OTHER IMPACTS:

Tuning engines for low organic emissions is likely to increase emissions of NOx.

COMMENTS:

Difficult to enforce because--

- operators do a lot of field maintenance and adjustments to improve performance,
- machines have no license plates; are not registered,
- owners/operators move equipment to many different job sites, including other states.

P R O P O S E D C O N T R O L M E A S U R E - # 2 2

CONTROL MEASURE NAME: **Vegetable Oil Manufacturing**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#81 Other Organics Evaporation	14.7	10.9	Tons/Day
Current Estimate	"	"	
Subject to Control		0.8	
Potential Reduction		0.4	

COST EFFECTIVENESS: **\$1000/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	0.2	0.4	0.4	0.4	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Control measure would affect vegetable oil manufacturing plants by requiring control of solvent emissions from extractors, desolventizers, dryers, coolers and conveyors, per draft EPA Control Technology Guideline.

PROBABLE METHOD OF CONTROL:

Install mineral oil scrubber on extractor/desolventizer. Minimize solvent carry-over to dryer, cooler and conveyors by proper maintenance and operation.

OTHER IMPACTS:

COMMENTS:

There is only one vegetable oil manufacturing plant in the District. Some of the proposed controls have already been implemented.

P R O P O S E D C O N T R O L M E A S U R E - # 2 3

CONTROL MEASURE NAME: Aerospace Assembly and Component Coating Operations

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:			
#61 Industrial Coating-High Solv	73.7	15.3	Tons/Day
Current Estimate	"	"	
Subject to Control		2.3	
Potential Reduction		0.5	

COST EFFECTIVENESS: \$1000/ton

REACTIVITY: varies

YEAR OF ADOPTION: 1982

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	0	0.1	0.1	0.2	0.2	0.5	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Control measure would affect reactive organic compound emissions from primer and topcoat application, paint stripping, surface preparation and clean-up.

PROBABLE METHOD OF CONTROL:

Coatings manufacturers would reformulate paints by converting to water-borne or high-solids paints, or substituting non-reactive solvents for reactive solvents in conventional paints. Interim limits would become effective in 1983, final limits in 1985; military user exemption would expire in 1987.

P R O P O S E D C O N T R O L M E A S U R E - # 2 4

CONTROL MEASURE NAME: **Rubber/Plastic Products Manufacturing**

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:			
#74 Rubber/Plastic Prod. Mfg.	7.6	7.6	Tons/Day
Current Estimate	7.6	7.6	
Subject to Control	5.5	5.5	
Potential Reduction		1.1	

COST EFFECTIVENESS: **\$1600/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	1.1	1.1	1.1	1.1	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Major sources of organic emissions from rubber/plastic manufacturing are emissions of raw materials, monomers, solvents and other volatile liquids from reactors--blow down tanks--drying operations and emissions of solvents during storage and handling of thinned resins. Control equipment includes floating roof tanks or vapor recovery systems on volatile material, storage units, vapor recovery systems (adsorption or condensers). Purge lines that vent to flare system. and recovery systems on vacuum exhaust lines. Fugitive emissions must meet a leak detection and repair program (quarterly monitoring) with an action level of 10,000 ppm (expressed as methane).

PROBABLE METHOD OF CONTROL:

Storage tanks of greater than or equal to 37.5 M³ (10,000 gals.) and greater than or equal to 0.033 bar (0.5 PSIA) will require floating roof and two seals or vapor recovery of 95% by weight or any any alternative that can be proved to meet 95% (wt.) control of organic emissions. Install vapor recovery units for process vessel vents, truck loading and drum filling stations, and easily manifolded relief valves or an alternative of venting emissions to a certified flare or incinerator at 95% control. Pump seals will be retrofitted with dual seals (barrier fluid and degassing vents to the compressor. Exempt any process vent that emits smaller than or equal to 5 kg (11 lbs) of organic material per day.

P R O P O S E D C O N T R O L M E A S U R E - # 2 5

CONTROL MEASURE NAME: **Pleasure Boats**

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:			Tons/Day
#136 Pleasure Boats - diesel	0.3	0.3	
#137 Gasoline, 2-Stroke	6.3	6.9	
#138 Gasoline, 4-Stroke	6.3	6.9	
Total	12.9	14.1	
Subject to Control		13.8	
Potential Reduction		7.0*	

COST EFFECTIVENESS: **\$8000/ton**

REACTIVITY: **high**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	0	0	1.4	3.5	5	7	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Emission standards for new boat engines to control HC emissions. Set standard to achieve a 50% inventory reduction by 1987. A change in usage towards sailboats, instead of gasoline-powered boats (prevalent on coastal areas), should also reduce HC emissions. The latter, however, may be unenforceable.

PROBABLE METHOD OF CONTROL:

Similar to automotive engine controls.

OTHER IMPACTS:

Use controls would be difficult to enforce. ARB responsibility for hardware controls on engines for reasons of precedent, expertise, and statewide uniformity.

ALTERNATIVE CONTROL MEASURE 25-B: *****NOT REASONABLY AVAILABLE*****

Ban use of 2-cycle engines on ozone days.

ALTERNATIVE 25-C: *****NOT REASONABLY AVAILABLE*****

Ban all I C engine pleasure boats on high ozone days.

*Note that summer day reductions would be approximately twice annual average daily reductions.

P R O P O S E D C O N T R O L M E A S U R E - # 2 6

NOT REASONABLY AVAILABLE

CONTROL MEASURE NAME: **Marine Lightering Retrofit**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#79 Lightering, Marine Transfer	4.5	4.1	Tons/Day
Current Estimate	7	7	
Subject to Control		4	
Potential Reduction		3	

COST EFFECTIVENESS: **\$15,000/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	0	1	2	3	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Require 90% control of VOC emissions from lightering in District waters. Large tankers transporting crude oil sometimes find it necessary to offload part or all of their cargo into smaller tankers or barges because of draught restrictions.

PROBABLE METHOD OF CONTROL:

Hydrocarbon vapors are displaced from the cargo holds of the smaller vessel during filling. These emissions can be controlled by ducting displaced vapors back to the "mother" ship, for disposal at sea.

OTHER IMPACTS:

Companies who do not have a dedicated fleet may not be able to comply. SB 1732 (Marks, 1982) would prohibit State ARB from implementing any emission requirements for marine vessels prior to July 1, 1982. ARB is to submit recommendations to the Legislature by that date. Both report and prohibition may be delayed one year. Coast Guard jurisdiction for marine vessel safety.

ALTERNATIVE CONTROL MEASURE 26-B

Dredge ship channels to eliminate need for lightering.

P R O P O S E D C O N T R O L M E A S U R E - # 2 7

CONTROL MEASURE NAME: **Off-Road Motorcycles**

EMISSION ESTIMATES:

	<u>1979</u>	<u>1987</u>	
BAAQMD Inventory:			Tons/Day
#166 Offroad Motorcycle-2 stroke	1.6	2.2	
#167 -4 stroke	0.8	1.1	
Total	2.4	3.3	
Subject to Control		2.2	
Potential Reduction		0.8	

COST EFFECTIVENESS: **\$400/ton**

REACTIVITY: **high**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	.3	.5	.6	.8	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Ban sale of new 2-stroke motorcycles in favor of 4-stroke.

PROBABLE METHOD OF CONTROL:

New rule, banning the sale of off-road motorcycles with 2-stroke engines. If 2-stroke motorcycles were replaced by 4-stroke, an estimated 24% reduction in total HC emission would be achieved. This amounts to 0.8 tons/day. For 1987 increase in 4-stroke motorcycle ownership brings an additional 0.3 tons/day of HC emissions, but there would be a decrease of 1.2 tons/day due to the phasing out of 2-stroke motorcycles (it is estimated 40% 2-stroke motorcycles in 1987. Hence, a net decrease of 0.8 tons/day.

OTHER IMPACTS:

Some buyers may purchase 2-stroke bikes outside the region and bring them in. Would require ARB action for uniform policy statewide.

COMMENTS:

Most off-road riding done on weekends in rural areas; may have little effect on weekday urban ozone. Use controls would be difficult or impossible to enforce.

ALTERNATE CONTROL MEASURE #27-B:***NOT REASONABLE AVAILABLE***

Ban use of off-road motorcycles on high ozone days.

P R O P O S E D C O N T R O L M E A S U R E - # 2 8

CONTROL MEASURE NAME: **Industrial Maintenance Coatings**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#63 Other Coating - High Solv.	19	20	Tons/Day
Current Estimate	"	"	
Subject to Control		2	
Potential Reduction		1	

COST EFFECTIVENESS: **\$1000/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	0	0.5	1	1	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Control measure would affect organic solvent emissions from in-use maintenance painting of machinery and equipment.

PROBABLE METHOD OF CONTROL:

Measure would require reformulation of paints by the coatings industry. Water-borne or high-solids coatings would be substituted for conventional high solvent paints.

OTHER IMPACTS:

COMMENTS:

These coatings are typically applied to equipment in the field by owners, operators or repair personnel--not manufacturers. Potential problem exists for the application of unconventional coatings by non-expert personnel.

P R O P O S E D C O N T R O L M E A S U R E - # 2 9

CONTROL MEASURE NAME: **Sanitary Landfill Sites**

EMISSION ESTIMATES:		1979	1987	
BAAQMD Inventory:		<u>797</u>	<u>867</u>	Tons/Day
#175 Bio-degradation (99+ wt. % methane)				
Current Estimate		797	867	
Subject to Control			867	
Potential Reduction		--	858	
Non-methane reduction			7.2	

COST EFFECTIVENESS: **\$3600/ton** (reactive organics)

REACTIVITY: **low**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:		1982	1983	1984	1985	1986	1987	
Reduction		<u>0</u>	<u>0</u>	<u>0</u>	<u>3.5</u>	<u>7.1</u>	<u>7.2</u>	Tons/Day reactives

DESCRIPTION OF CONTROL MEASURE:
Control measure would affect hydrocarbon emissions resulting from the anaerobic decomposition of solid waste at sanitary landfill sites, with exemption for sites below a certain acreage size. The control measure assumes 50% of emissions are subject to control in 1985, the remaining 50% in 1986.

PROBABLE METHOD OF CONTROL:
Install gas wells and header system to collect hydrocarbon gases, which would be ducted to a combustion device for disposal. An alternate is to process gases to separate methane from non-methane portion; combust non-methane portion and pipe methane portion to fuel customer or gas pipeline.

OTHER IMPACTS:

COMMENTS:
Sale of methane portion could substantially reduce costs or may result in a profit.

PROPOSED CONTROL MEASURE - # 30

CONTROL MEASURE NAME: **Marine Vessel Gas-Freeing**

EMISSION ESTIMATES:

	<u>1979</u>	<u>1987</u>	
BAAQMD Inventory:	<u>3.8</u>	<u>3.3</u>	Tons/Day
#79 Lightering/etc.	7		
Current Estimate		0.1	
Subject to Control		0.1	
Potential Reduction			

COST EFFECTIVENESS: **\$500/ton**

REACTIVITY: **medium**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	<u>0</u>	<u>0</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Prohibit gas-freeing within District waters.
Exemptions for safety or ships in harbor may be considered.

PROBABLE METHOD OF CONTROL:

Operations of tankers and barges that carry petroleum products often wash and aerate the cargo tanks of such vessels, prior to dry-docking or changing cargos. These emissions can be controlled by carrying out such housekeeping operations outside District waters or by venting to a vapor recovery system.

OTHER IMPACTS:

COMMENTS:

Difficult to enforce.

PROPOSED CONTROL MEASURE - # 31

CONTROL MEASURE NAME: **Tanker Ballasting**

EMISSION ESTIMATES:

	<u>1979</u>	<u>1987</u>	
BAAQMD Inventory:			
#79 Lightering/Marine Transfer	3.8	3.3	Tons/Day
Current Estimate	7	7	
Subject to Control		3	
Potential Reduction		2.5	

COST EFFECTIVENESS: **\$1600/ton**, but already required; no new costs.

REACTIVITY: **low**

YEAR OF ADOPTION: **1981**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction		1	2	2.5	2.5	2.5	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

No action necessary by District. United States Coast Guard has promulgated a rule (33 CFR, Parts 154-155) effective June 1, 1981. This rule requires either a segregated ballast, or washed ballast tank and inert gas system. The rule is applicable to tankers of size greater than 40,000 DWT.

PROBABLE METHOD OF CONTROL:

Segregated ballast, internal vapor balance, compression ballasting, or vapor recovery/disposal.

OTHER IMPACTS:

P R O P O S E D C O N T R O L M E A S U R E - # 3 2

CONTROL MEASURE NAME: **New Electronic Industry Regulation**

EMISSION ESTIMATES:

	<u>1979</u>	<u>1987</u>	
BAAQMD Inventory:			Tons/Day
Various Categories			
Current Estimate	8	9	
Subject to Control	7.5	8	
Potential Reduction		5.7	

COST EFFECTIVENESS: **\$1800/Ton**

REACTIVITY: **medium-high**

YEAR OF ADOPTION: **1982**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction		2.9	5.7	5.7	5.7	5.7	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Measure would require 85% reduction in organic emissions from photoresist line and solvent cleaning operations in the electronic industry.

PROBABLE METHOD OF CONTROL:

Carbon adsorption or catalytic oxidation.

OTHER IMPACTS:

COMMENTS:

Control measures are already being developed. New information expected from industry technical committees and BAAQMD engineers.

P R O P O S E D C O N T R O L M E A S U R E - # 3 3

CONTROL MEASURE NAME: **Coating of Plastics**

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:	<u>73.7</u>	<u>15.3</u>	Tons/Day
#61 Industrial Coatings	7.6	7.6	
#73 Rubber/Plastic Prod. Mfg.		5	
Current Estimate		3	
Subject to Control		2	
Potential Reduction			

COST EFFECTIVENESS: **\$1000/ton**

REACTIVITY: **medium**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	<u>0</u>	<u>0</u>	<u>1</u>	<u>1</u>	<u>2</u>	<u>2</u>	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

The control measure would require the use of high-solids or water-borne coatings for coating plastic parts and products. The measure will require the reformulation of paints by the coating industry.

PROBABLE METHOD OF CONTROL:

As described above.

OTHER IMPACTS:

Would affect electronics, automotive, and toy industries.

P R O P O S E D C O N T R O L M E A S U R E - # 3 4

NOT REASONABLY AVAILABLE

CONTROL MEASURE NAME: **Pleasure Boat Fueling** (Gasoline)

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#50-55 Fuel Distribution	<u>19.7</u>	<u>16.5</u>	Tons/Day
Current Estimate			
Subject to Control		0.2	
Potential Reduction		0.2	

COST EFFECTIVENESS: **\$15,000/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	<u>0</u>	<u>0</u>	<u>.02</u>	<u>.02</u>	<u>.02</u>	<u>.02</u>	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Change Regulation 8, Rule 7, to include dispensing gasoline to boats.

PROBABLE METHOD OF CONTROL:

Vacuum assist systems for gasoline dispensing at marinas.

OTHER IMPACTS:

COMMENTS:

Present systems not effective for this source application because of:

- long hose requirements for access,
- storage tanks often at higher elevation than dispensing point so vacuum assist not usable,
- variety of filler neck configurations on boat give poor interface,
- increased likelihood of spills on boats with tank vent pipe level below fill neck.

This measure appears to be impractical because of technical and safety problems, high cost, low reduction potential, and temporal pattern of emissions (expect most pleasure boat use on weekends).

P R O P O S E D C O N T R O L M E A S U R E - # 3 5

CONTROL MEASURE NAME: **New Source Review**

EMISSION ESTIMATES:				
BAAQMD Inventory:		<u>1979</u>	<u>1987</u>	Tons/Day
all categories				
Current Estimate				
Subject to Control				
Potential Reduction			0.2	

COST EFFECTIVENESS: varies from **savings** to a max cost of **\$8000/ton**

REACTIVITY: **varies**

YEAR OF ADOPTION: **1982**

IMPLEMENTATION SCHEDULE:							
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0.1	0.2	0.2	0.2	0.2	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Control measure would affect new and modified sources subject to the "New Source Review" requirements of the permit regulation(Regulation 2 - Rule 2). Organic emission offset ratio requirements would be increased from 1.0:1 to 1.1:1 or 1.2:1, for offsets provided on-site. Emission profiling would be eliminated from emission offset calculation procedures in favor of annual average calculations. Emission profiling would only be used to determine if emission increases were in excess of the de minimus level of 250 lb/day. The proposed strategy should simplify procedures and require less time for processing, which would provide some cost savings for the applicants. However, the cost of providing additional offsets would likely be higher than range of costs to meet RACT requirements. A worst case estimate for cost effectiveness is \$8000/ton.

PROBABLE METHOD OF CONTROL:

Modify Regulation 2 - Rule 2 to require an increased organic emission offset ratio.

COMMENTS:

Must define treatment of permits, offsets, banking transactions which take place after plan adoption but before rule adoption.

P R O P O S E D C O N T R O L M E A S U R E - # 3 6

CONTROL MEASURE NAME: **Ozone from Irradiation Beams**

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:	<u>0</u>	<u>0</u>	Tons/Day Ozone
none	0.1	0.1	
Current Estimate		0.1	
Subject to Control		0.1	
Potential Reduction			

COST EFFECTIVENESS: **\$1000/ton**

REACTIVITY: **N/A**

YEAR OF ADOPTION: **1982**

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	<u>0</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	<u>0.1</u>	Tons/Day Ozone

DESCRIPTION OF CONTROL MEASURE:

Control measure would affect operations which employ irradiation beams and emit ozone directly. Sources are primarily located in Santa Clara County.

PROBABLE METHOD OF CONTROL:

Measure would require installation of high surface area, iron oxide packed scrubbers on ozone emitting sources.

OTHER IMPACTS:

PROPOSED CONTROL MEASURE - # 37

NOT REASONABLY AVAILABLE

CONTROL MEASURE NAME: Tree Replacement

EMISSION ESTIMATES:			
BAAQMD Inventory:	1979	1987	
#177 Vegetation	493	493	Tons/Day
Current Estimate			
Subject to Control	125	125	
Potential Reduction		5	

COST EFFECTIVENESS: unknown

REACTIVITY: high

YEAR OF ADOPTION: 1983

IMPLEMENTATION SCHEDULE:							
	1982	1983	1984	1985	1986	1987	
Reduction			1	2	3	5	Tons/Day Ozone

DESCRIPTION OF CONTROL MEASURE:
Require replacement of 10% of high VOC emitting species (e.g. certain hardwoods and conifers) with low-emitting, preferably native, species. Focus on public lands.

PROBABLE METHOD OF CONTROL:
Replace 10% of trees on public lands in central area of the District. Primary Implementing agencies: U.S. Forest Service, State Parks, East Bay and other Park Districts, California Department of Forestry.

OTHER IMPACTS:
Sensitive issue--may meet resistance for aesthetic and political reasons. Could produce income for landowner if trees have lumber or firewood value. If this action increases the supply and/or emissions from woodfires during winter, such emissions could interfere with attainment of carbon monoxide and particulate standards.

P R O P O S E D C O N T R O L M E A S U R E - # 3 8

CONTROL MEASURE NAME: **Large Commercial Bakeries**

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:			
#32 Bakeries (Industrial	1.6	1.8	Tons/Day Ozone
Current Estimate		1.2	
Subject to Control		1.1	
Potential Reduction @ 90%			

COST EFFECTIVENESS: **undetermined**

REACTIVITY: **low**

YEAR OF ADOPTION: **1984**

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	0	0	.2	0.5	0.9	1.1	Tons/Day Ozone

DESCRIPTION OF CONTROL MEASURE:

Control measure would affect only the large commercial bakeries using the sponge-dough process of making bread. Commercial bakeries using the sponge-dough process should be encouraged to convert to a straight-dough process, if possible. Since the majority of the organic emissions will be emitted from the ovens during baking, control measure would require incineration of organic gases emitted from the baking oven.

PROBABLE METHOD OF CONTROL:

Control measures will take the form of requiring commercial bakeries using the sponge-dough process to install direct flame or catalytic afterburners downstream of their baking ovens. Alternative means of control may involve recirculation of organic gases emitted from the ovens to the flame zone of the oven (method available only if direct-fired ovens are used); the use of an existing boiler as an afterburner.

OTHER IMPACTS:

COMMENTS:

May be difficult to remove low concentrations of organic compounds from large air volumes.

NOT REASONABLY AVAILABLE

CONTROL MEASURE NAME: Develop and Tighten Plant Emission Limits

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:			Tons/Day
#11, 12, 42, 44, 47-51, 57,			
58, 61, 62, 65, 75-77, 79, 81	90	90	
Current Estimate	"	"	
Subject to Control		50	
Potential Reduction		5	

COST EFFECTIVENESS: varies with source category:

surface coating -	\$5000/ton
petroleum refining -	\$11,000/ton
auto assembly -	\$30,000/ton

REACTIVITY: varies

YEAR OF ADOPTION: 1984

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	0	0	0	0	0	5	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Control measure would affect stationary sources with stationary source organic emissions greater than 100 tons per year. Proposed strategy would require the District to develop maximum allowable emission limits for these facilities and then require a 10% reduction of baseline organic emissions at each facility. Baseline emission calculations would include the effect(s) of any RACT rule(s). Each facility would determine the most cost effective means of achieving the 10% reduction. Since RACT is currently required at most of the affected facilities, the cost effectiveness for this measure would likely be greater than the range of RACT costs encountered to date, and may include the use of RACT on existing sources. Three years has been proposed as a reasonable time period to implement the required control strategy.

PROBABLE METHOD OF CONTROL:

Expected to vary with source category and/or specific facility. The method of control may include: the replacement of existing manufacturing units with less polluting sources, the possible curtailment or shutdown of highly polluting sources and the use of less polluting sources to manufacture needed materials.

OTHER IMPACTS:

COMMENTS:

Difficult to find new reductions beyond present and proposed regulations.

PROPOSED CONTROL MEASURE - # 40

NOT REASONABLY AVAILABLE

CONTROL MEASURE NAME: **Airport Fuel Transfer (Gasoline)**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#50-55 Fuel Distribution	<u>19.7</u>	<u>16.5</u>	Tons/Day
Current Estimate			
Subject to Control		.08	
Potential Reduction		.08	

COST EFFECTIVENESS: **\$3500/ton**

REACTIVITY: **low**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0	0	.08	.08	.08	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Change Regulation 8 to include airport facilities in Rules 6 and 7.

PROBABLE METHOD OF CONTROL:

Measure would require vapor recovery at:
 1) Truck loading rack for distribution to planes.
 2) Nozzle islands for planes and on bulk truck.

OTHER IMPACTS:

COMMENTS:

Present control equipment designed for automobiles; suitability and compatibility with aircraft systems has not been tested. CARB and FAA may have jurisdiction. Important safety considerations.

PROPOSED CONTROL MEASURE - # 4 1

CONTROL MEASURE NAME: **New Service Stations**

EMISSION ESTIMATES:

BAAQMD Inventory:	<u>1979</u>	<u>1987</u>	
#55 Filling Sta.-Veh. Tanks	6.4	5.5	Tons/Day
Current Estimate		.01	
Subject to Control		.002	
Potential Reduction			

COST EFFECTIVENESS: **unknown**, very high cost/ton because little or no reduction.

REACTIVITY: **low**

YEAR OF ADOPTION: **1983**

IMPLEMENTATION SCHEDULE:

	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
Reduction	0	0				.002	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Modify Regulation 8, Rule 7 to require the use of secondary assist vapor recovery systems for vehicle fueling at new service stations. Non-retail equipment would be exempted.

PROBABLE METHOD OF CONTROL:

Secondary assist at new service stations, expected to increase collection efficiency.

OTHER IMPACTS:

COMMENTS:

CARB certified balance system and vacuum assist at the same level of control. SCAQMD study shows performance of both types of systems are the same. Doubtful that addition of vacuum assist would reduce emissions.

P R O P O S E D C O N T R O L M E A S U R E - # 4 2

CONTROL MEASURE NAME: Zero Gap Seals on Floating Roof Tanks

EMISSION ESTIMATES:

	1979	1987	
BAAQMD Inventory:	<u>12.2</u>	<u>12.5</u>	Tons/Day
#47 Ref. Storage & Blending	1.2	0.9	
#50 Bulk Plant Storage Tanks	1.2	1.0	
#57 Storage Tanks - Solvent	1.8	2.0	
#58 Storage Tanks - Other	16.4	16.4	
Total			
Subject to Control		1.2	
Potential Reduction			

COST EFFECTIVENESS: \$1200/ton

REACTIVITY: medium

YEAR OF ADOPTION: 1984

IMPLEMENTATION SCHEDULE:

	1982	1983	1984	1985	1986	1987	
Reduction	<u>0</u>	<u>0</u>	<u>.2</u>	<u>.5</u>	<u>1.0</u>	<u>1.2</u>	Tons/Day

DESCRIPTION OF CONTROL MEASURE:

Require a tight-fitting secondary seal on most floating-roof storage tanks.

PROBABLE METHOD OF CONTROL:

A tight-fitting seal, such as the RFI Weatherguard, exerts a pressure of 30 psi on the wall of the tank. This control measure would reduce emissions from 370 tanks in the District.

OTHER IMPACTS:

COMMENTS:

About 90 tanks in the Bay Area already use these seals.

APPENDIX B

TRANSPORTATION CONTROL MEASURES

TRANSPORTATION CONTROL MEASURES (TCMs)

EMISSION ESTIMATES:

BAAQMD Inventory:	1979			1987		
	HC	CO	NO _x	HC	CO	NO _x
Cars & Light Duty Trucks	297.0	2450.0	239.0	159.0	1470.0	146.0
Heavy Duty Trucks & Buses	28.1	402.0	70.8	18.7	457.0	39.2
Motorcycles	5.0	15.1	0.2	2.4	7.1	0.2
Total	330.1	2867.1	310.0	180.1	1934.1	185.4
Current Estimate	330.1	2867.1	310.0	180.1	1934.1	185.4
Subject to Control	283.1	2867.1	310.0	162.7	1934.1	185.4
Potential Reduction				2.15	25.89	2.48

COST EFFECTIVENESS: All of the proposed TCM's have other benefits in addition to the listed emission reductions. The costs could not be attributed solely to air quality, so a cost-effectiveness number was not calculated.

REACTIVITY: high

YEAR OF ADOPTION: 1982

IMPLEMENTATION SCHEDULE:

Reduction		1982	1983	1984	1985	1986	1987	tons/day
		HC	0.00	0.25	0.90	1.41	1.84	2.15
	CO	0.00	2.78	9.48	15.27	20.44	25.89	
	NO _x	0.00	0.10	0.87	1.58	2.15	2.48	

DESCRIPTION OF CONTROL MEASURE:

15 individual transportation control measures are proposed. Each is described in detail on the following pages.

TCM #1: Reaffirm commitment to 28% transit ridership increase between 1978 and 1983

EMISSION
REDUCTION
ESTIMATES: Since this measure was included in the 1979 Air Quality Plan, its effects were included in the baseline emissions inventory and no additional credits are claimed.

COST: The cost of supplying this level of transit service was included in the Transportation Improvement Program. Thus there are no additional costs associated with this measure.

IMPLEMENTATION
SCHEDULE:

- o MTC reaffirms measure in 1982 Review of Air Quality Plan
- o Assess effectiveness of measure in annual RFP reports

DESCRIPTION OF
CONTROL MEASURE:

In the 1979 Air Quality Plan, MTC adopted a strategy to improve transit service based upon the transit operators' five year plans. It was estimated that this strategy would increase transit ridership by 28% between 1978 and 1983. The plans are being implemented and the ridership has been increasing consistent with the target. This TCM would reaffirm the commitment to the 1979 strategy.

OTHER IMPACTS

- o According to 1970 census, the San Francisco-Oakland urbanized area had 14.97% of all workers commuting on transit. In 1980, the proportion had increased to 17.47%.
- o The shift to transit is partially responsible for the decline in gasoline consumption in the Bay Area.
- o Congestion at bottlenecks has not appreciably worsened, even though the number of people traveling through these corridors has increased.

TCM #2: Support post-1983 improvements identified in operator's 5-year plans, after consultation with the operators adopt ridership increase target for 1983-1987.

EMISSION
REDUCTION
ESTIMATES: These emission reduction estimates are predicated on a 15% ridership increase. The actual target would be determined after consultation with the transit operators.

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
HC:	0	.21	.38	.55	.63	tons/day
CO:	0	2.18	4.13	5.85	7.34	
NO _x :	0	.36	.68	.94	1.04	

COST: Costs of maintaining the existing level of services is currently programmed in regional allocations. Ridership increases would come from productivity improvements, thus additional costs would be moderate.

IMPLEMENTATION
SCHEDULE:

- o 6 major transit operators adopt FY 1983-87 plans by July, 1982
- o MTC consults with operators on ridership targets by August, 1982
- o MTC, through implementation of the TIP and allocation of regional funds, seeks to ensure operators' 5-year plans are implemented
- o Ridership gains are monitored through annual RFP reports

DESCRIPTION OF
CONTROL MEASURE:

This measure is basically an extension of TCM #1. Since federal funds for transit purposes are being cut back, many of the improvements identified in the 5 year plans deal with increased productivity. Thus, while the size of the transit system may not grow significantly, the ridership is expected to increase.

OTHER IMPACTS

- o 31,600 gallons of gasoline saved.
- o Alternatives to automobile travel will be increased.

TCM #3: Seek to expand and improve public transit beyond committed levels.

EMISSION
REDUCTION
ESTIMATES:

	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	
HC:	0	.11	.19	.26	.32	tons/day
CO:	0	.87	1.65	2.34	3.77	
NO _x :	0	.18	.34	.47	.54	

COST: The transit operators have submitted capital requests for FY 83-87. Of these, \$119.4 million cannot be funded with currently anticipate revenues. Additional funds would also be needed for operating subsidies. However, this program has other benefits, as the costs can be solely attributed to air quality.

IMPLEMENTATION
SCHEDULE:

- o MTC seeks sources of new revenue -- ongoing effort
- o If funding exists, transit operators implement plans to expand services.

DESCRIPTION OF
CONTROL MEASURE:

The transit operators have submitted capital requests which cannot be funded with presently anticipated revenues. These capital requests were previously for service expansions. MTC is exploring ways of raising additional revenue but the fiscal problems of the federal and state governments make it unlikely that significant additional revenues can be generated in the near future.

OTHER IMPACTS

- o 16,300 gallons of gasoline saved per day.
- o Alternatives to automobile travel will be increased.

TCM #4: Continue to support development of HOV lanes. (Emission credit would not be allowed for specific projects until environmental studies were completed and funds were programmed.)

EMISSION
ESTIMATES: Depends on specific project.

COST: Varies by specific project design and implementation. Since these projects do have other benefits, the costs cannot be solely attributed to air quality.

IMPLEMENTATION
SCHEDULE:

- o MTC will continue to support HOV lanes where justified on a case by case basis.
- o I-580 through Dublin Canyon - EIS to be completed Fall, 1982, project implementation by 1987.
- o I-580 from Rte. 24 to Bay Bridge - EIS to be completed Fall, 1983, project implementation by 1987.
- o Rte. 101 in Marin (Stage 2) - Negative Declaration under review, project implementation by 1986.
- o I-80 - EIS to be completed September, 1983, project implementation unknown.
- o Rte. 237 from Lawrence Expressway to Rte. 17 - environmental documentation under review, construction by 1984-85

DESCRIPTION OF
CONTROL MEASURE:

High occupancy vehicle lanes permit exclusive rights of way to vehicles with three or more people. Included in this measure are projects which have highway ramp meters with an HOV bypass lane.

OTHER IMPACTS

- o Increases capacity without adding to congestion
- o Incentive for transit use and ridesharing

TCM #5: Continue to support RIDES efforts.

EMISSION
ESTIMATES: Since this measure was included in the 1979 Air Quality Plan, its effects are incorporated in the baseline emissions inventory and no additional credit is claimed.

COST: Funds are already programmed to assist the RIDES effort so there are no additional costs associated with this measure.

IMPLEMENTATION
SCHEDULE:

- o MTC reaffirms measure in 1982 Review of Air Quality Plan
- o Effectiveness of measure assessed in annual RFP reports

DESCRIPTION OF
CONTROL MEASURE:

RIDES, a non-profit corporation funded by Caltrans District 4 and the MTC is the primary agency for ridesharing services. RIDES offer two services. One is a carpool-matching program targeted to specific employers. The second is a vanpooling program where the agency leases vans to the participants. RIDES has been successful in both of these efforts.

OTHER IMPACTS

- o The use of RIDES services are partially responsible for the decline in gasoline consumption in the Bay Area. RIDES estimates that, through their efforts, 3.6 million gallons of gas were saved in FY 1980-81.
- o Increases capacity without increasing congestion

TCM #6: Continue efforts to obtain funding to support long-range transit improvements.

EMISSION ESTIMATES: It is not anticipated any of these projects included in this measure can be implemented prior to 1987. Hence no emissions credits are claimed. MTC will nevertheless support long-range transit improvements where justified.

COST: Project design costs over the next 5 years total \$35 million. Construction costs of the Guadalupe project over the next 5 years is \$181 million. Because these projects have other benefits, the costs cannot be solely attributed to air quality.

IMPLEMENTATION SCHEDULE: Assuming federal funding for new rail starts:

- o Guadalupe - engineering design to be completed Fall, 1983
- o BART - design of North Concord and Warren Springs extensions will begin in FY 82-83

DESCRIPTION OF CONTROL MEASURE: Long range transit improvements that are currently being studied included a light rail line in the Guadalupe Corridor and various BART extensions. None of these will be fully operational before 1987, but design and construction of some of these segments are programmed in the next five years.

OTHER IMPACTS

- o Increases capacity without increasing congestion
- o Demand for electrical power will increase

TCM #7: Reaffirm commitment to preferential parking program

EMISSION
ESTIMATES: Since this measure was included in the 1979 Air Quality Plan, its effects were included in the baseline emissions inventory and no additional credits are claimed.

COST: The cost of providing some of the preferential parking projects are included in the Transportation Improvement Program. Thus there are no additional costs associated with this measure.

IMPLEMENTATION
SCHEDULE:

- o MTC reaffirms measure in 1982 Review of Air Quality Plan
- o Caltrans to open 6 lots in FY 1982-83, 3 in FY 1983-84, and 8 in FY 1984-85
- o Assess effectiveness of measure in annual RFP reports

DESCRIPTION OF
CONTROL MEASURE:

Caltrans has opened a number of fringe parking lots and is planning to open 17 more in next 5 years. Caltrans also has a program which allows free vanpool parking in downtown San Francisco.

OTHER IMPACTS

- o The use of preferential parking facilities is partially responsible for the decline in gasoline consumption in the Bay Area.

TCM #8: Encourage transit operators to work with Caltrans to identify under-utilized lots along major transit lines which could be used as park-and-ride lots.

EMISSION ESTIMATES:	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
HC:	0	.02	.03	.03	.04 tons/day
CO:	0	.09	.16	.31	.46
NO _x :	0	.01	.02	.03	.05

COST: The equivalent annual cost of this measure is \$22,850. Because these projects have other benefits, the costs cannot be solely attributed to air quality.

IMPLEMENTATION
SCHEDULE:

- o Continue the on-going program which will establish 14 new joint use parking lots per year.

DESCRIPTION OF
CONTROL MEASURE:

Caltrans has a project called the Joint Usage Lot Program. This program encourages the use of available retail parking lot areas to be used for park-and-ride purposes. Caltrans provides liability insurance to the parking lot owners. The parking lot owner operates and maintains the parking area.

OTHER IMPACTS

- o 1,900 gallons of gasoline will be saved per day
- o Transit ridership should increase
- o The program makes better use of existing resources

TCM #9: Continue present Commute Alternatives Program

EMISSION ESTIMATES:	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
HC:	.02	.04	.05	.06	.07 tons/day
CO:	.22	.42	.59	.75	.86
NO _x :	.02	.04	.06	.07	.09

COST: The equivalent annual cost of this measure is \$35,420. Because this program has other benefits, the costs cannot be solely attributed to air quality.

IMPLEMENTATION
SCHEDULE:

- o Implement the Commute Alternatives Program for the years 1983 through 1987.
- o Train thirty Commute Coordinators each year.

DESCRIPTION OF
CONTROL MEASURE:

The Commute Alternatives Program encourages alternatives to the single occupant auto trips. The Program informs employers of alternatives such as ridesharing, bicycling, flextime, and a host of other projects. The Program trains Commute Coordinators within a firm to promote the goals of the Program.

OTHER IMPACTS

- o 3,500 gallons of gasoline are saved per day.
- o Congestion is relieved.

TCM #10: Encourage cities to change regulations to decrease parking requirements for employers who encourage car/vanpooling.

EMISSION ESTIMATES:	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
HC:	0	.04	.08	.11	.13 tons/day
CO:	0	.44	.83	1.17	1.49
NO _x :	0	.07	.14	.19	.23

COST: The equivalent annual cost of this measure is \$13,700. Because this program would have other benefits, this cost cannot be solely attributed to air quality.

IMPLEMENTATION
SCHEDULE:

- o July 1982 conduct a municipal parking ordinance survey.
- o Beginning in July 1983, provide information to cities and employees.

DESCRIPTION OF
CONTROL MEASURE:

Parking requirements differ considerably among municipalities within the region. Some requirements do not permit parking space reductions even if the development were near a major transit station. This proposal would be a voluntary change in parking requirements--initiated by the city or county.

OTHER IMPACTS

- o 7,000 gallons of gasoline saved per year
- o Development density will increase
- o Possible savings in land costs for developers

TCM #11: Complete the bicycle element of the MTC Regional Transportation Plan.

EMISSION ESTIMATES:	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
HC:	.11	.21	.29	.35	.40 tons/day
CO:	1.46	2.61	3.63	4.52	5.38
NO _x :	.04	.07	.10	.13	.14

COST: The equivalent annual cost of this measure is \$2,100,000. Because there are other benefits, the cost cannot be attributed solely to air quality.

IMPLEMENTATION
SCHEDULE:

- o Adoption of bike plan into RTP - September 1982
- o Implementation of bike plan through MTC staff administration of TDA Article 3, review of parking ordinances, encouragement of legislation, etc., September 1982 - September 1984.

DESCRIPTION OF
CONTROL MEASURE:

MTC is currently preparing a regional bicycle plan which will contain a set of policies to direct future bicycle efforts. The Plan will likely contain a number of specific actions MTC could take to facilitate bicycle usage. One such action would be to produce a model bicycle parking ordinance and encourage local governments to adopt this. The ordinance would require a minimum level of bicycle parking facilities at new developments. A second effort would be to distribute a bicycle parking checklist to area merchants. This checklist would enable those merchants who would like to provide bicycle parking to estimate the potential usage. It would also provide suggestions on types of racks, siting requirements, and other factors.

OTHER IMPACTS

- o Bicyclist safety will be improved.
- o Health benefits for those who bicycle.
- o 3,300 gallons of gasoline saved per day.

TCM #12: Continue MTC Commute Alternatives Program and place additional emphasis on flextime program

EMISSION ESTIMATES:	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
HC:	.12	.22	.30	.36	.42 tons/day
CO:	1.10	2.26	3.30	4.20	5.00
NO _x :	.04	.13	.20	.27	.33

COST: The equivalent annual cost of this program is \$13,800. However, this program has other benefits, so the cost cannot be solely attributed to air quality.

IMPLEMENTATION
SCHEDULE:

- o Conduct 2 Commute Coordinator training session per year. An average of 15 coordinators are trained in each course.

DESCRIPTION OF
CONTROL MEASURE:

The purpose of this measure is to provide information to employers as to the benefits of permitting their employees to work on flexible hours. They would entail personal contacts and follow up work. Flexible working hours permit employee choice of travel times, hence congestion avoidance can occur.

OTHER IMPACTS

- o 14,400 gallons of gasoline will be saved per day
- o Congestion will be reduced.
- o Use of existing transportation facilities will be improved

TCM #13: Encourage cities to use CEQA review proecdures to restrict the development of commercial drive-through facilities.

EMISSION ESTIMATES:	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
HC:	0	.05	.07	.10	.12 tons/day
CO:	0	.52	.83	1.09	1.34
NO _x :	0	.01	.02	.03	.04

COST: No additional costs are associated with this measure.

IMPLEMENTATION
SCHEDULE:

- o Contact the cities in the Region with populations over 50,000 by the end of 1984 and explain the use of CEQA review for limiting drive-through facilities.

DESCRIPTION OF
CONTROL MEASURE:

Development of drive through facilities for banks and restaurants can be discouraged under local jurisdiction enforcement of the California Environmental Quality Act (CEQA). The cities of Berkeley and Palo Alto historically have used CEQA to accomplish this goal and, hence, reduce the automobile emissions from idling.

OTHER IMPACTS

- o 1,000 gallons of gasoline will be saved per day

TCM #14: Encourage large delivery fleet operators to restrict vehicle idling either through company policy or the use of vehicle controls.

EMISSION ESTIMATES:	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
HC:	0	0	.01	.01	.01 tons/day
CO:	0	.05	.08	.11	.13
NO _x :	0	0	.01	.01	.01

COST: The equivalent annual cost of this measure is \$4,100.

IMPLEMENTATION
SCHEDULE:

- o Contact selected city and county vehicle maintenance personnel. January - June 1983.
- o Contact state and federal vehicle maintenance personnel. July - December 1983.
- o Contact corporate vehicle purchasing and maintenance personnel. January - June 1984.

DESCRIPTION OF
CONTROL MEASURE:

This action is intended to reduce idling by delivery vehicles. Fleet operators could accomplish this by revising company policies or by installing a mechanical device. The U.S. Postal Service has experimented with an inexpensive (approximately \$18) delay switch which turns off the motor if the driver's seat is left unattended after 10 seconds.

OTHER IMPACTS

- o User cost savings may exist in certain instances.
- o Accidents and vehicle thefts may be reduced.

TCM # 15: Disseminate information on the economic and technical benefits of alternative engines and fuels to fleet operators in the Bay Area.

EMISSION ESTIMATES:	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>
HC:	0	0	.01	.01	.01 tons/day
CO:	0	.04	.07	.10	.12
NO _x :	0	0	.01	.01	.01

COST: The equivalent annual administrative cost of this measure is \$4,100.

IMPLEMENTATION
SCHEDULE:

- o Prepare information articles to be included in Transactions. December 1982
- o Contact federal, state, county, and city vehicle purchasing and maintenance personnel. January - December, 1983
- o Contact corporate vehicle purchasing and maintenance personnel. January - June 1984

DESCRIPTION OF
CONTROL MEASURE:

There are two potential conversions that could be applied to fleet vehicles. One is the conversion to propane fuel. The cost to convert a vehicle to propane is approximately \$1,000. However, there are savings in fuel and maintenance costs. The Palo Alto Police Department has converted 10 of its vehicles to propane and projects a net savings of \$20,000 over three years.

The second potential conversion is to electric vehicles. In this case, the conversion would be through replacement of fleet vehicles, rather than conversion of existing vehicles. The U.S. Postal Service has been operating electric vehicles on short to medium length mail routes in Cupertino since 1974. The Service is pleased with the operational and economic characteristics. Although electric vehicles themselves are virtually pollution-free, there are emissions from the generation of electricity. However, since power plans already have fairly stringent emission control equipment, there would be a net air quality benefit.

OTHER IMPACTS

- o User cost savings may exist in certain circumstances
- o 1,100 gals/gas saved per day

APPENDIX C

ADDITIONAL MEASURES RECOMMENDED BY
THE JOINT AIR QUALITY PLANNING AND ADVISORY COMMITTEE
FOR CONSIDERATION IN THE DRAFT 1982 PLAN

CONTROL MEASURE NAME: LAND USE CONTROLS

Analysis of development trends during the late 1970s in the Bay Area showed that distances between home, work, shopping, school and recreation were increasing in ways that would cause more serious air pollution. This was because development was becoming ever more scattered, at lower density, with more separation between where people live and where they go. In many fringe areas, development occurred without sewer, water or transit service. Older city areas were bypassed, with little rebuilding or use of vacant land where urban services already existed or were committed. Densities got even lower because the preponderance of residential construction was for single-family homes or large suburban lots. Densities were also getting lower because of the need for large lots in locations where health and safety dictate it to accommodate use of septic tanks and wells, as well as to enable building on steeper slopes. The pattern of urban sprawl resulted in increasing dependence on the automobile. More people used the auto for more purposes at ever greater distances.

In recent years, these trends have begun to reverse as a result of limited land availability, high housing costs and mortgage interest rates, and other factors. This program (commonly known as "compact growth") was proposed as part of the draft Environmental Management Plan for the Bay Area, and was overwhelmingly rejected by the regional and local policy boards evaluating the draft plan.

This measure would reduce auto dependency and thereby improve air quality. Sixteen specific policies and 49 actions were identified that indicate what government agencies would need to do to alter development patterns to bring about more compact development. The policies and actions include adopting urban services areas, extending development consistent with those areas, building on bypassed land within existing areas. They also involve encouraging densities consistent with earlier local practice (e.g. the 1900s and 1930s), and would allow in certain instances mixed residential, commercial and industrial areas. They also would mean adopting programs to reduce the imbalance between jobs and housing throughout the region, so that distances between jobs and homes can be shortened. The compact growth policies and actions described in this chapter would reduce automobile emissions and improve air quality. They are a more precise statement of the city-centered policy adopted by the ABAG General Assembly in the Regional Plan of 1970 and the General Assembly's growth policy actions of 1973 and 1974. Some of the policies and actions are already being carried out by some local jurisdictions in the Bay Area. Not all actions would be required of every city and county--or every public agency involved. Specific actions would be determined in cooperation with the jurisdictions involved in subsequent years of the continuing planning process.

The policies and actions are as follows:

Policy A: Extend new development only to those locations with existing sewer and water service or sewer and water service committed in capital improvement programs.

Action 1: Local Agency Formation Commissions (LAFCOs) adopt city and special district spheres of influence throughout the region as soon as possible.

Action 2: LAFCOs adopt the "urban service area" concept for defining urban service commitments and projecting urban land needs for 5, 10 and 20 year periods.

Action 3: LAFCOs approve annexations and formation of cities and special districts consistent with Action 2 findings on urban service commitments and urban land needs.

Action 4: Counties and cities enact non-urban zoning outside urban service areas.

Action 5: Counties and cities enact temporary moratoria on urban zoning and subdivisions outside urban service areas pending the enforcement of non-urban zoning in such areas.

Policy B: Restrict development outside urban service areas in areas of critical environmental concern (environmental resources, hazards, or amenities).

Action 6: Counties and cities enact agricultural zoning or large-lot rural residential zoning (generally one dwelling unit per 40 acre minimum lot size).

Action 7: Counties and cities initiate, continue or expand programs under the California Land Conservation Act (Williamson Act), the Open Space Easement Act of 1974 and the Z'berg-Warren-Keene-Collier Forest Taxation Reform Act of 1976 outside urban service areas.

Action 8: Counties and cities establish programs of public land management (including acquisition, purchase/leaseback, purchase/transfer of development rights, etc.) for locations outside urban service areas.

Policy C: Develop unimproved land within urban service areas where urban services exist or are committed in capital improvement programs.

Action 9: ABAG, counties, cities and LAFCOs establish "early warning" inter-agency information exchange programs concerning urban service facility plans at the earliest stages of project planning.

Action 10: Expedite city, county, LAFCO or ABAG project reviews where needed information on service capacities has been provided under Action 9 above.

Action 11: Counties and cities initiate rezoning and permit preference procedures in locations with existing but unused service capacities (with emphasis on water, sewer, transportation and school services).

Policy D: Complete, as soon as possible, all needed sewer, water or transportation service improvements within adopted urban service areas.

Action 12: LAFCOs review all city, county, or special district sewer, water, or transportation service capital improvement programs and report on priority needs within each urban service area.

Action 13: ABAG review sewer, water and transportation needs within all urban service areas to determine regionwide priorities among such service needs.

Action 14: ABAG favorably review applications for State/Federal financial assistance from agencies lacking service capacity within urban service areas, where other existing or committed services have been found by the LAFCO to be capable of accommodating additional development.

Policy E: Improve highway, street, road and transit systems consistent with local actions to stage land development.

Action 15: Counties and cities enact planning and zoning regulations to stage land development consistent with the scheduling of urban services (including but not limited to 'development sequence zoning', 'tiered zoning districts', development timing permits etc.).

Action 16: Caltrans, MTC, counties, cities, and special districts plan, program, fund and construct highway, street, road and transit improvements consistent with local action to stage land development.

Policy F: Increase housing and job opportunities in existing urbanized areas by encouraging public and private rebuilding into compatibly mixed commercial, industrial and residential land uses.

Action 17: Counties and cities initiate and/or expand housing conservation programs in existing urbanized areas.

Action 18: Counties and cities initiate and/or expand commercial and industrial development and redevelopment in existing urbanized areas.

Action 19: Counties, cities and special districts initiate and/or expand incentives to public and private redevelopment in urbanized areas. Emphasis would be on sewer and water facilities, and extensive transit service improvements, but should also include educational and cultural facilities and public safety service improvements where appropriate.

Action 20: ABAG, counties and cities analyze possible local revenue reforms to provide adequate financial resources to carry out Action 19.

Action 21: ABAG support State legislation to provide local governments with adequate fiscal resources to carry out Action 19.

Action 22: ABAG oppose Federal and State legislation that would hamper the ability of local governments to carry out rebuilding programs to increase job and housing opportunities in existing urbanized areas.

Policy G: Encourage "infill" development of bypassed vacant land within urban service areas.

Action 23: Counties and cities undertake planning studies to inventory bypassed land, identify development problems, and resolve questions of best potential use.

Action 24: Counties and cities adopt necessary changes in zoning and permit procedures to facilitate development of bypassed parcels affected by special conditions.

Action 25: Service agencies design sewer, water and transportation systems to improve accessibility and service ability of bypassed vacant land in existing urban communities.

Policy H: Develop at higher densities within service areas where existing or committed urban service capacities, including transit, can support the higher densities.

Action 26: In urban service areas with adequate sewer, water and transit capacities, counties and cities rezone appropriate locations to permit higher densities.

Action 27: Counties and cities enact ordinances (such as those for planned unit development or cluster zoning) to foster higher densities on appropriate sites.

Policy I: Limit development of land within urban service areas where soil, slope, or other conditions can support only low-density development.

Action 28: Counties, cities and special districts deny primary urban services to these locations by excluding them from capital improvement programs and design of service systems, and by enactment of hookup moratoria, etc.

Action 29: Counties, cities, and special districts establish programs of public land management (including but not limited to public land acquisition, purchase/transfer of development rights, purchase/leaseback, etc.) to maintain appropriate sites in open uses.

Policy J: Improve the balance of jobs and housing in jurisdictions throughout the region to reduce the necessity for long distance home-to-job travel.

Action 30: Cities and counties adopt programs to increase local employment opportunities if a substantial proportion of their residents work elsewhere.

Action 31: Cities and counties adopt programs to increase local housing opportunities in a price range suitable for their work forces if a substantial proportion of their work forces live elsewhere.

Action 32: ABAG conduct A-95 and EIR reviews to support local government efforts to improve the balance of jobs and housing in communities throughout the region.

Action 33: ABAG support State and Federal funding allocations for facilities and programs offering incentives to economic development or housing development in appropriate jurisdictions.

Policy K: Mix residential/commercial and industrial development in communities throughout the Bay Region.

Action 34: Counties and cities revise zoning ordinances to allow compatible mixtures of land uses with adequate design or performance standards (including planned unit developments, performance standard zoning, etc.).

Action 35: Counties and cities expand application of conditional use permits where appropriate.

Policy L: Discourage new large-scale land development projects that are exclusively commercial, industrial or residential, unless such projects clearly demonstrate that they improve the overall balance of jobs and housing in that city, county, or subregion.

Action 36: Counties, cities and LAFCOs deny incorporation or annexation of large-scale development proposals that are exclusively commercial, industrial or residential, unless such incorporation or annexation can be shown to improve the overall balance of jobs and housing in the city, county, or subregion.

Action 37: MTC, the California Department of Transportation and transportation districts deny regional transportation system access or extension to proposed large-scale land development projects that are exclusively commercial, industrial or residential unless such transportation actions can be shown to improve the overall balance of jobs and housing in the city, county or subregion.

Policy M: Fund new wastewater and transportation facilities only after areas serviced have taken actions recommended in the plan.

Action 38: The State Water Resources Control Board and the Environmental Protection Agency require applicants for wastewater facilities under Section 201 of the Federal Water Pollution Control Act to demonstrate, prior to construction funding, that specific actions (including but not limited to land development regulations, urban service commitments, etc.) have been taken by affected jurisdictions to carry out actions of this plan.

Action 39: The U.S. Department of Transportation, the California Transportation Commission, the California Department of Transportation and the Metropolitan Transportation Commission require applicants for transportation improvement grants to demonstrate, prior to funding for acquisition and construction that specific actions (including but not limited to land development regulations, urban service commitments, etc.) have been taken by affected jurisdictions to carry out actions of this plan.

Policy N: Review development proposals for air quality effects and consistency with compact development (indirect source review).

Indirect sources of air pollution are sources that do not directly emit pollutants, but which include emissions from other sources (primarily motor vehicles). An Indirect Source Review program would be used for two purposes: first, to ensure consistent application of the compact development policies; and second to prevent localized carbon monoxide problems in the vicinity of the indirect source.

The types of new or modified sources to be reviewed for approval under this measure would include, but would not be limited to, the following:

- Highways and roads;
- Parking facilities;

- Retail, commercial, and industrial facilities;
- Recreation, amusement, sports, and entertainment facilities;
- Airports;
- Office and government buildings;
- Apartment and condominium buildings;
- Education facilities.

The above sources would include most large projects.

The review procedure would be limited, however, to developments above certain size thresholds, specified in terms of daily traffic volumes for highways, annual aircraft operations for airports, and number of parking spaces for most other facilities. Indirect sources smaller than the threshold sizes are assumed to be evaluated and controlled as part of the overall compact development strategy.

Action 40: ABAG, BAAPCD and MTC adopt memoranda of understanding and procedures for prompt and thorough joint review of significant development proposals. Review would be conducted for proposals (such as shopping centers, industrial parks, office complexes, etc.) where significant air pollution could result from the project's generation of auto traffic.

Action 41: BAAPCD adopt permit procedures for application to indirect sources.

Action 42: ABAG encourage and support local government efforts to determine direct and indirect effects on air quality in making local land use decisions. Such support shall include technical assistance and analysis.

Action 43: ABAG and MTC encourage and support local government efforts to reduce adverse effects of development proposals on air quality, including but not limited to assistance in identifying and implementing mitigation measures for adverse impacts of municipal wastewater facilities and transportation improvement programs.

Policy D: Adopt financial programs to support local and regional agency actions and private sector development actions consistent with policies in this chapter to reduce home-to-work distance and auto dependency.

Action 44: ABAG, counties and cities support State and Federal legislation to provide subventions and other fiscal assistance to cities and counties carrying out development policies to achieve air quality standards.

Action 45: ABAG, counties and cities support State and Federal legislation providing tax incentives to the private sector for rebuilding and development within existing urbanized areas.

Action 46: ABAG, counties and cities support State and Federal legislation providing financial support to local and regional agencies for carrying out development management policies and reviews to achieve air quality standards, especially to mitigate adverse impacts on low- and moderate-income households.

Policy E: Adopt a coordinated regionwide program for carrying out actions for attainment and maintenance of air quality standards through development and land use management actions by cities, counties, special districts, ABAG, BAAPCD, MTC, LAFCOs and other appropriate local and regional agencies.

Action 47: ABAG identify, within six months of General Assembly adoption of an initial air quality maintenance plan, which implementing actions are being carried out by local and regional agencies.

Action 48: ABAG include, in each annual revision of the AQMP, agreements reached among local and regional agencies for carrying out land use and development management actions included in the initial AQMP.

Action 49: ABAG shall include, in each annual revision of the AQMP, an identification of actions not being carried out by all appropriate agencies, and which actions are to be carried out by appropriate agencies by the next annual revision of the AQMP.

CONTROL MEASURE NAME: INDIRECT SOURCE REVIEW (MANDATORY)

COST EFFECTIVENESS: UNKNOWN

YEAR OF ADOPTION: 1983

DESCRIPTION OF CONTROL MEASURE:

This measure would require review of development projects, such as shopping centers, which generate or attract traffic. Indirect sources are those uses such as listed below, which produce no significant air contaminant emissions themselves but do attract large volumes of traffic which can lead to air quality problems. Mitigation measures would be required if projected emissions from traffic generated by any project--or cumulative with nearby projects--would exceed air quality standards. Such measures would be most effective if introduced early in the planning and design stages. Cooperation of local governments and transit agencies would be essential for effective implementation of some mitigation measures.

This mandatory review process would replace "Advisory Review of Projects and Plans" for indirect sources above specified size criteria. A new category of Authority to Construct permits would be issued to applicant-developers by the BAAQMD. As an alternative mechanism, each city and county in the District could amend its building permit regulations to include air quality requirements according to uniform standards. In the latter case, the local applications would be reviewed by BAAQMD or by the three co-lead air quality planning agencies. Comments on the permits would then be forwarded to the cities and counties for their final permit actions.

This measure would help to achieve attainment, as well as ensure long-term maintenance of federal standards for carbon monoxide, ozone, and particulate.

Only large development projects would be subject to review. The threshold values would be set for various kinds of projects and plans, based upon the number of vehicle trips which would be generated. Some examples are:

Residential development	200 dwelling units
Parking lot or garage	200 spaces
Shopping areas	100,000 sq. ft. gross floor area
Hotel	400 rooms
Theater	800 seats
Local plans*	affecting 10 acres
Airports, stadiums, free-ways, ports/marinas, quarries, transit programs.	all

*Government actions such as area plans and extension of urban service areas.

These thresholds are based on estimated approximations of the emission levels for stationary sources which trigger the new source review process, including requirements for BACT and offsets. Final threshold values would be chosen based upon desired stringency vs. administrative costs.

In 1979 the BAAQMD adopted an indirect source review regulation, following a federal requirement. Threshold levels at that time were much higher (1,000 dwelling units, 1000 parking spaces, etc.); and both the federal and local requirements were dropped within two weeks. Thus there is no actual local experience with the control measure.

CONTROL MEASURE: INCREASE PUBLIC SUPPORT FOR TRANSIT

EMISSION ESTIMATES: IF ACHIEVED, THIS MEASURE WOULD COMPLEMENT TCM #3 AND AID IN ACHIEVING THE EMISSION REDUCTIONS IDENTIFIED UNDER THAT MEASURE.

COST EFFECTIVENESS: UNKNOWN

YEAR OF ADOPTION: 1982

DESCRIPTION OF CONTROL MEASURE:

The Bay Area, like other regions in the nation, requires large public subsidies to fund their transit operations. In fiscal year 1980-81, Federal assistance of \$41 million covered 9% of the costs of this region's transit operations. The current administration plans to phase out transit operating assistance by 1985. The transit operators are trying to maintain services by cutting costs through productivity improvements. In addition, most operators are raising fares this year. However, the ability to obtain additional non-Federal revenues to replace the Federal cuts is severely limited. MTC recommends that, rather than cutting out Federal subsidies altogether, Congress should adopt a new formula for distributing the monies that is largely based on service factors.

The administration has expressed a commitment to continued funding of bus and railcar replacement and related capital projects. A recent analysis revealed that local transit operators will need \$800 million between 1981-85 just to sustain and modernize the existing capital plants. If transit operators are to make a dent in these costs, their capital funding must at least be maintained at historic levels. Unfortunately, it appears that reductions are also being made in this program. The administration is also seeking to eliminate funds for transit expansion. Bay Area projects which are threatened by this include planned BART extensions and the Guadalupe light rail line. MTC recommends that the bus and rail modernization and the new starts programs should be reauthorized.

ADDITIONAL TRANSPORTATION CONTROL MEASURES IDENTIFIED BY
THE CALIFORNIA AIR RESOURCES BOARD FOR CONSIDERATION IN
THE DRAFT 1982 PLAN

The following transportation control measures (TCMs) have been implemented in various cities in the United States and Canada. Each example is summarized and a reference and/or contact person is given. Some of the TCMs listed are already being implemented in the Bay Area in some form or in limited areas (i.e., by some cities or counties). They are presented here because they are good examples which may aid in strengthening the Bay Area programs.

I. EMPLOYER TRANSPORTATION PROGRAMS

General Comments

Employer transportation programs have been successful in reducing the number of single occupancy vehicles (SOV) trips, and their development in the Bay Area should be encouraged. The Santa Clara Manufacturers Association has already initiated a rideshare program. We propose that MTC identify other areas where public or private employer programs could be formed. It is especially important for each area to set strong target goals as did the El Segundo Employers Association to reduce SOV trips.

1. South Placer County Trip Reduction Ordinances

Local jurisdictions in South Placer County have adopted ordinances that generally require existing and new employers of 200 plus employees to develop plans to reduce commute vehicle trips by 30% and to designate transportation coordinators. To our knowledge, these are the only ordinances to focus on a trip reduction target. The local jurisdictions have also established a regional transportation coordinator's office under a joint powers agreement, with authority over employer trip reduction activities. The South Placer ordinance followed the model presented in Ridesharing As An Air Pollution Control Measure by D. L. McNerny and M. H. Scheible (ARB). A copy

of this publication and one of the South Placer County ordinances are enclosed.

Reference: South Placer Policy Committee. "Report to the California Transportation Commission", May 28, 1982. (excerpt enclosed)

2. Denver, Colorado

The Denver ordinance to reduce air pollution resulting from emissions from single occupancy automobile travel encourages public transit, ridesharing, and other emission reduction modes of travel. Every major employer and business landlord in the area must submit a written compliance plan for each business location with 100 or more employees or 250 or more tenants. Employers are required: (1) to disseminate information about carpool matching service, RTD routes, and bike routes; (2) to establish auto and bike parking facilities; (3) to provide a guaranteed space for each carpool and/or vanpool; (4) to provide an adequate number of bicycle parking facilities if parking for motor vehicles are provided or subsidized.

Reference: Regulation No. 9, "The Reduction of Automobile Air Pollution in the Denver Region through the Encouragement of Travel to and from Work by Public Transit, Ridesharing, and other Emissions. Reducing Travel Modes." (copy enclosed)

3. Tyson's Corner, Virginia

Tyson's Corner, a large development in suburban Virginia 12 miles west of Washington, D. C., employs 25,000 workers who commute in 20,000 autos. To alleviate congestion, fifty of Tyson's largest corporations formed the Tyson's Transportation Association (TTA) to provide a comprehensive ridesharing coordination, a mid-day shuttle service for employee lunch hours, and vanpool coordination. In the future, new development permits will be conditional on several commitments by the developer such as estimated ridesharing program, pay parking to encourage pooling, bus shelters, shuttle services, etc..

Reference: Letter from Eric Schreffler, Center for Transportation Studies, MIT, 77 Massachusetts Avenue, Cambridge, Massachusetts 02139.

4. El Segundo, California

The El Segundo Employers Association (ESEA) was established in 1981 by employers in the El Segundo/Los Angeles International Airport area to design solutions to that area's transportation problems. A goal of 50% participation in the Association's carpooling program has been suggested as reasonable.

Reference: Talk given at "California Commuting Cyclist Conference" by Don Torluemke, Executive Director, ESEA. El Segundo Employers Association Annual Report, 1981-82. (copy enclosed)

II. TRANSIT

1. Telephone Information Systems

A computerized telephone access program has been installed in Columbus, Ohio, San Diego, California, and a number of Canadian cities. Its purpose is to reduce uncertainty and wait time at bus stops by computerizing bus schedules and quickly providing arrival times to the public. Aimed at the occasional user, it is particularly effective in increasing off-peak ridership; i.e., the off-peak ridership has been increased by 19.7% in Ottawa. Briefly, the system operates as follows:

1. Each bus stop has a phone number.
2. A caller dials the bus stop number from home.
3. The computer searches the schedule.
4. A computerized voice relays the arrival times of the next several buses for that stop.

The system responds quickly with no delays and can handle as many as 22,000 calls a day.

Contact: Jim Schmidt
Teleride Corporation
Fox Plaza, Suite 208
1390 Market Street
San Francisco, CA 94102

III. BICYCLES

General Comments

Bicycles are a non-polluting alternative to motorized vehicles. A number of cities such as Palo Alto have included the development of bicycle facilities in the city plans and zoning ordinances. MTC could work with other cities and counties to encourage the inclusion of bicycle facilities in local ordinances.

1. Palo Alto, California

The City of Palo Alto Zoning Ordinance states that "bicycle facilities shall be provided for any new building constructed and for any new use established, for any addition or enlargement of an existing building or use, and for any change in the occupancy of any building or the manner in which any use is conducted that would result in additional (motorized vehicle) parking facilities being required..." Depending on the type of land use, safe bicycle parking is provided in the amount of 10% of that provided for automobiles. For recreation areas, bicycle parking is provided in the amount of 30% of that provided for automobiles.

Reference: City of Palo Alto. "Zoning Regulations," March, 1978.

2. Santa Barbara, California

The Santa Barbara Metropolitan Transit District (SBMTD) initiated a Bike-Bus Service to provide bicyclists with long distance door-to-door transportation. A person can bicycle to the bus stop, load the bike on a minibus trailer, travel by bus, and unload the bike

for use at his/her destination. In addition, bike storage will also be provided at bus stops.

Contact: Gary Gleason
Project Manager
Santa Barbara Metropolitan Transit District
P. O. Box 355
Santa Barbara, CA 93102

3. Davis, California

In 1966, Davis adopted a city plan stating that bicycle facilities will be considered in the design of all arterials and collector streets. Davis is one of the few cities with a complete bike lane system. Approximately forty miles of Class I and II lanes have been constructed providing bicycle access to all parts of town. It is estimated that 25 percent of all trips are by bicycle in Davis.

Reference: City of Davis. General Plan.
EPA. Bicycling and Air Quality Information Document.
September, 1979.

4. Monterey, California

The Air Quality Plan prepared by AMBAG in 1978 estimated a 0.04 tons/day reduction in emissions could be achieved in 1981 if the use of bicycles increased as a form of transportation. A survey of four Monterey businesses indicated that a 2.8% mode-shift to bicycles occurred with the provision of bicycle parking facilities at these businesses. The mode-shift resulted in a reduction of 431.7 driven vehicle miles traveled (DVMT). It was estimated that this reduction in DVMTs reduced carbon monoxide, hydrocarbons, and nitrogen oxides by .0017, .0116, and .0019 tons/day, respectively for the four businesses. If bicycle facilities were installed throughout the area, this could result in a substantial reduction in auto emissions for the region.

Reference: AMBAG Bicycle Commuting and Air Quality. April, 1981.

5. Livermore, California

Under the direction of Don Torluemke, the Lawrence Livermore Laboratory achieved a 10% bicycle ridership. Torleumke, now executive director of the El Segundo Employees Association, has set similar goals for that area.

6. Sacramento, California

The Sacramento bikelane system is not complete. As the system develops, the number of bicyclists using the system increases. One and five-tenth percent of state employees in Sacramento bicycled to work in 1979. In 1982, 4.2 percent of employees commuted to work by bike.

Reference: Office of Facilities, Planning, and Development. Status Report: Transportation Management in the Capitol Area. March, 1982.

IV. PARKING

1. Los Angeles, California

The City of Los Angeles parking management program allows a company to provide less than code required parking if the company accepts full responsibility for providing and maintaining ridesharing alternatives.

Contact: Graham O. Smith
Office of the Mayor
Room 1400, City Hall
Los Angeles, CA 90012
(213) 48503365

2. Portland, Oregon

The purpose of the Portland ridesharing program is to increase ridesharing through promotion schemes, parking incentives, and direct contact with employers. It is estimated that this results in a reduction of 376,213 vehicle miles traveled daily, 24,493

gallons of gas daily, and 3,480 tons of vehicle emissions a year. Although the program includes a number of measures, there are two specific parking items that deserve consideration: (1) administering the downtown parking permit program whereby preferential parking is given to carpools for only \$15 per month, and (2) operating preferential on-street carpool parking program. We feel that both of these items could be implemented in the Bay Area.

Reference: Schwartz & Connally, Inc., Innovative and Successful Transportation Control Programs. December, 1980. (copy enclosed)

3. Sacramento, California

In order to fulfill one of the transportation control measures mandated by 1979 Regional Air Quality Plan, Sacramento City and County formed the Parking Management and Alternative Program. The purpose of the program is to discourage auto driving and encourage alternate modes of travel. This will be accomplished by one or both of the following strategies: (1) to eliminate the use of 1850 parking spaces or to enact pricing and supply limitation measures; and (2) to limit the availability of long term parking during the peak commute.

Reference: City and County of Sacramento. Parking Management and Alternative Transportation Incentive Program. January, 1981.

V. FLEX TIME

1. Seattle, Washington

The Seattle-King County Commuter Pool surveyed employees in the Seattle area after flex time was instigated at their place of employment. The data indicated that 6 percent of the employees shifted their commute time to an earlier hour. It was estimated that large scale adoption of flex time could increase the "effective transportation system capacity" by approximately 11%.

Reference: Harrison, F.D., "Flexible Work Hours and Commuting Choices: Survey Results from Downtown Seattle." Available from Seattle-King County Commuter Pool, 704 Third Avenue, Seattle, Washington 98104.

VI. LAND USE MEASURES

1. CTRPA Indirect Source Review

In 1977, the California Tahoe Regional Planning Agency established standards and procedures for reviewing and approving new indirect sources of air pollution. New businesses that are indirect sources of air pollution must mitigate the air quality impact as a condition for receiving a permit. Emissions must be mitigated to the amount of 1.5 times that produced by the indirect source, or emission fees will be charged. The fees are used for programs such as improved transit.

Reference: California Tahoe Regional Planning Agency. Indirect Source Review. (copy enclosed)

2. Saratoga, California

The City of Saratoga has adopted a policy to deny all applications for new developments incorporating a drive-up facility. The purpose of the ordinance is to reduce fuel consumption, air pollution, and the use of the automobile, as well as to preserve the rural nature of the city.

Reference: Planning Commission of the City of Saratoga, "A Resolution Adopting A Policy Barring Inclusion of Drive-Up Facilities in New Developments Within the City of Saratoga" (Resolution No. PC-125).

VII. FLEET MANAGEMENT

1. GasCAP (Gasoline Conservation Awareness Program)

GasCAP is a fuel conservation program that enables an organization to provide its basic service but at the same time conserve fuel. In concept, the program saves fuel and costs by modifying behavior patterns of the employee drivers and by upgrading maintenance and management procedures. A minimum of 10% fuel savings has been achieved in organizations where this program has been implemented. The program has air quality benefits in emphasizing reducing cold starts through trip management and in maintaining engines in good repair.

Reference: "GasCAP - General Information." Unpublished report by West Valley College.

VIII. VOLUNTARY AND INTERMITTANT DEVICES

1. Ventura, California

Ventura's air quality plan includes: (1) enforcement of controls on major stationary sources and employers of 100 or more employees for predicted days of high ozone concentrations; (2) education of the public to reduce voluntarily the use of motor vehicles, utility equipment, and pesticides during high ozone days; (3) three voluntary transportation/land use measures; (a) encouraging local colleges to reduce fees for those who rideshare and including ridesharing forms in registration packets; (b) encouraging local governments to reduce parking requirements for new or modified facilities for employers who encourage ridesharing; (c) requesting ridesharing coordination among groups of small

employers; (4) a provision that future revision of the county's land use planning program will include transportation efficiency in relation to air quality as a key component of the decision making process.

2. Santa Barbara, California

Santa Barbara either has implemented or is considering the following measures in its air quality plans: (1) street signs at busy intersections recommending shutting off car engines; (2) ban on drive-up windows; (3) standard mitigation measures for new development; and (4) transportation system subsidies from new source offsets.

3. Fresno, California

Fresno has adopted an indirect source review program consisting of an improved CEQA air quality review.

4. Sacramento, California

Sacramento's air quality plan includes: (1) voluntary subsidizing of bus fares by employers; (2) encouraging flex time; (3) discouraging large homogeneous land use patterns; and (4) direct public education on improvement of air quality by individuals.

MTC STAFF RESPONSE TO THE ARB PROPOSALS

I. Employer Transportation Programs

A number of employer programs are underway in the Bay Area. RIDES has an outreach program directed at major employers. MTC conducts the Commute Alternatives Program, which trains coordinators to aid employees of their firms. These programs are included in the draft recommendations as TCM's 5 and 9.

There are no jurisdictions in the Bay Area with a ridesharing ordinance directed at major employers. At the present time, it appears that the response to the voluntary programs is fairly good. In addition, the administrative costs are reasonable. It may be appropriate, however, to consider a ridesharing ordinance as a contingency measure, to be enacted if the response to the voluntary programs drops off.

II. Transit

Transit measures were included in the Plan as TCM's 1, 2, 3, and 6. The transit operators individually and collectively have various information programs--including schedules, maps, telephone information, computerized district listings shared by all information centers, and regional transit guides. A telephone information system, as described in the ARB proposal, has been explored and determined not yet to be cost-effective in this region.

III. Bicycles

MTC has developed a draft regional bicycle plan which does call for development of a model ordinance for cities. The bike plan is scheduled for adoption in September of this year (1982).

IV. Parking

There are a number of preferential parking programs in the Bay Area. These were discussed in Chapter 2 of the Plan. A measure encouraging cities to reduce parking requirements for employers who promote ridesharing is included as TCM 10.

V. Flex Time

Flex time can be an effective measure; it is included in the Plan as TCM 12.

VI. Land Use Measures

An advisory indirect source review program is included in the draft Plan. In addition, a mandatory program was recommended by the Joint Air Quality Planning and Advisory Committee for consideration. Discouraging drive-up facilities is also included in the Plan as TCM 13.

VII. Fleet Management

TCM 14 addresses idling controls for delivery fleet operators and TCM 15 covers alternative engines and fuels.

VIII. Voluntary and Intermittant Devices

A program which calls for voluntary reductions in travel on high ozone days may have potential air quality benefits, even though no credit can be claimed in the air quality plan. Further work is needed to better define such a program.

APPENDIX D

CONTROL MEASURES CONSIDERED NOT REASONABLY AVAILABLE

CONTROL MEASURES CONSIDERED NOT REASONABLY AVAILABLE

The following measures were considered in the development of control alternatives, but are not recommended. As described below, these measures are not considered to be reasonably available for attainment of the federal ozone and/or carbon monoxide standards.

Stationary Source Controls

Lawnmowers--Ban use of gasoline powered lawnmowers on high ozone days--Difficult to enforce; could be voluntary. (BAAQMD Control Measure No. 18-B.)

Farm Tractors--Require (hardware) controls on new gasoline tractors--would require ARB to set statewide emissions limits; manufacturers would have to redesign specifically for California market; problems with state law which prohibits controls on "implement of husbandry;" difficult to enforce because no registration/licensing system. (BAAQMD Control Measure No. 20.)

Diesel Construction Equipment--Require periodic adjustment to manufacturer's specification--Operators do frequent field maintenance and adjustments for good performance (not lowest emissions); difficult to enforce because no registration system and frequent moves to different job sites, even across state lines. (BAAQMD Control Measure No. 21.)

Pleasure Boats--Ban use of 2-cycle engines on high ozone days--Difficult to enforce. (BAAQMD Control Measure No. 25-B.)

Pleasure Boats--Ban use of all internal combustion engines on high ozone days--Difficult to enforce. (BAAQMD Control Measure No. 25-C.)

Marine Lightering Retrofit--Modify vessels for vapor balance, or equivalent, to achieve 90% control--Difficult to achieve unless statewide or nationwide requirement, or dedicated fleet; safety considerations and Coast Guard jurisdiction; problems with state law. (BAAQMD Control Measure No. 26.)

Off-road Motorcycles--Ban use of off-road motorcycles on high ozone days--Difficult to enforce; could be voluntary. (BAAQMD Control Measure No. 27-B.)

Pleasure Boat Refueling--Require vapor recovery at marinas--Not technically feasible; high cost and low potential for ozone reduction. (BAAQMD Control Measure No. 34.)

Tree Replacement--Require replacement of 10% of trees on public lands in central Bay Area--Politically unpopular; costs and secondary effects unknown. (BAAQMD Control Measure No. 37.)

Plant Emission Limits--Reduce emissions from large stationary sources by 10% below present baseline--Arbitrary reduction of 10% may not be achievable; could be most expensive. (BAAQMD Control Measure No. 39.)

Airport Fuel Transfer--Require vapor recovery at airports for gasoline transfer to trucks and planes--Small emission reduction potential; technical difficulties; safety problems and FAA jurisdiction. (BAAQMD Control Measure No. 40.)

Transportation Control Measures

MTC staff looked at a wide range of transportation control measures (TCMs) within the categories listed under Section 108(F) of the Clean Air Act. In general, TCMs are ineffective for a number of reasons:

- o The vehicle fleet will be much cleaner by 1987. Thus, the vehicle travel reductions which can be achieved by many of the TCMs reduce emissions only slightly.
- o Because TCMs reduce hydrocarbons (HC) and oxides of nitrogen (NO_x) simultaneously, they have virtually no impact on ozone levels.
- o TCMs have only minor impacts on travel. The gas price increase in 1979 was quite significant, but resulted in only minor travel reductions.

MTC considered a number of transportation controls when the Air Quality Plan was first adopted in 1979. Because TCMs were not found to be effective, MTC adopted the following guideline:

MTC policy supports measures that improve or enhance alternatives to the automobile without penalizing those dependent on the auto. These alternatives include transit, carpooling, and bicycle systems.

MTC also adopted a specific guideline on pricing alternatives:

Because the impact of specific pricing control measures appears quite small, MTC will consider such control measures only under certain conditions:

1. when problems of social and economic inequities in the transportation system are minimized and adequate transportation alternatives exist;
2. when such pricing measures are necessary to ensure that the transportation plan is feasible;
3. when such a measure is evaluated in detail and subjected to full-scale public hearings.

The current analysis, documented in the appendix to the Status Report to the JAQPAC in January, reaffirmed the general ineffectiveness of TCMs. Therefore, a change in the above guidelines was not justified. Accordingly, the following measures are not considered to be reasonably available:

1. Significantly increase bridge tolls
(HC: -0.10 tons, CO: -0.80 tons, NO_x: -0.12 tons, assuming tolls increased by 30%)
2. Increase parking rates
(HC: -0.24 tons, CO: -2.4 tons, NO_x: -0.37 tons, assuming parking rates increased by 50%)

3. Restrict parking on major streets in the morning and afternoon peaks
(HC: -0.31 tons, CO: -0.88 tons, NO_x: +0.05 tons. These are short-term impacts. Over the long term, the improved traffic flow may ultimately encourage more traffic.)
4. Substitute electric vehicles for conventionally powered vehicles
(HC: -1.5 tons, CO: -11.5 tons, NO_x: -1.0 tons, assuming 100,000 electric vehicles.)
5. Impose gas rationing
(HC: -29.9 tons, CO: -357.1 tons, NO_x: -45.7 tons, assuming supply reduced by 25%.)

APPENDIX E
EMISSION INVENTORIES, 1975-2000

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
District Emissions By Source Categories

1975 ANNUAL AVG.

BASE YEAR 1979

	TONS/DAY				
	PART	ROG	NOX	SO2	CO
Petroleum Refining	4.5	54.8	38.1	49.9	2.4
Fuels -Bulk Loading	--	16	--	--	--
Fuels -Filling Stations	--	38.9	--	--	--
Printing & Coating	--	185	--	--	--
Solvent Degreasing	--	9.7	--	--	--
Dry Cleaners	--	13.3	--	--	--
Rubber, Plastic Products Mfg.	--	9	--	--	--
Other Solvent Usage	--	20.3	--	--	--
Chemical Mfg.	2	1.2	3.4	84.5	37.6
Metallurgical & Mineral Ind.	32.3	0.3	0.1	1.3	3.2
Construction & Demolition	95.1	--	--	--	--
Gas Distribution	--	19.2	--	--	--
Other Industrial/Commercial	35.7	21.3	3.6	6.5	21.7
Domestic Fuel Usage	3.8	1	20.2	1	7.3
Commercial Fuel Usage	0.9	0.2	5.9	0.2	1.1
Industrial Fuel Usage	2.3	0.6	64.8	4.4	5.4
Electrical Generating Plants	4.6	0.1	64.8	28.2	4.9
Waste Burning & Incineration	2.3	1.6	0.7	0.2	9.5
Lawnmowers	0.1	4.7	0.5	0.1	43.8
Construction Equipments	3.9	5.3	45.9	3.8	32.4
Ships	0.8	12.7	8	18.3	55.9
Locomotives	0.4	1.7	5.3	0.8	1.9
Other Reciprocating Engines	0.4	10.4	10.9	0.2	68.2
Sub-total(District Jurisdiction)	187	428	272	199	295
Air Carriers	4	6.3	6.3	0.7	16.2
General Aviation	1.3	4.2	1.6	0.1	22.1
Military Aircraft	0.3	3	0.7	0.1	19.7
Cars, Lt. & Med. Duty Trucks	30.1	277	243	9.3	2670
Heavy Duty Trucks & Buses	6.7	55.3	76.3	5.6	771
Motorcycles	0.2	5.4	0.1	--	16.8
Farm Tractors	0.3	0.9	2.4	0.2	12.6
Sub-total (Mobile Sources)	42.8	352	331	16.1	3530
Accidental Fires	1	1.1	0.2	--	9.2
Paved & Unpaved Roads	189	--	--	--	--
Consumer Solvent Usage	--	40.1	--	--	--
Bio Degredation	--	6.1	--	--	--
Ocean Bay/Salt	42.4	--	--	--	--
**Vegetation	--	**	--	--	--
Sub-total (Other Sources)	232	47.3	0.2	--	9.2
TOTAL EMISSIONS	462	827	603	216	3830

** Vegetation emissions are about 500 t/day as estimated by ABAG for the BAAQMD

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
District Emissions By Source Categories

1979 ANNUAL AVG.

BASE YEAR 1979

	PART	ROG	NOX	SO ₂	CO
	----	----	----	----	----
Petroleum Refining	5.8	43.8	45.4	42.8	3.7
Fuels -Bulk Loading	--	5.1	--	--	--
Fuels -Filling Stations	--	14.6	--	--	--
Printing & Coating	--	158	--	--	--
Solvent Degreasing	--	8.4	--	--	--
Dry Cleaners	--	13.8	--	--	--
Rubber, Plastic Products Mfg.	--	8.5	--	--	--
Other Solvent Usage	--	24.4	--	--	--
Chemical Mfg.	1.5	0.7	0.9	48.3	31.6
Metallurgical & Mineral Ind.	37.2	0.3	0.1	1.4	3.3
Construction & Demolition	101	--	--	--	--
Gas Distribution	--	20	--	--	--
Other Industrial/Commercial	37	21.7	3.7	6.8	5.5
Domestic Fuel Usage	3.9	1	21.2	1.1	7.7
Commercial Fuel Usage	0.9	0.2	6.3	0.2	1.2
Industrial Fuel Usage	2.5	0.7	65.9	4.6	5.8
Electrical Generating Plants	7.8	0.7	102	50.7	6.7
Waste Burning & Incineration	1.5	0.8	0.8	0.3	3.9
Lawnmowers	0.1	5	0.5	0.1	47.5
Construction Equipments	4.3	5	50.2	4.2	13.6
Ships	0.8	13.4	8.6	16.1	58.2
Locomotives	0.3	1.4	4.4	0.6	1.0
Other Reciprocating Engines	0.4	11.2	11.2	0.2	73.4
Sub-total(District Jurisdiction)	205	359	321	177	264
Air Carriers	3.7	5.2	6.5	0.7	14.7
General Aviation	1.8	4.1	1.7	0.1	21.5
Military Aircraft	0.3	3.5	0.8	0.2	22.4
Cars, Lt.& Med. Duty Trucks	27.9	279	239	7.1	2450
Heavy Duty Trucks & Buses	5.7	24.2	70.8	9.4	402
Motorcycles	0.2	6.8	0.2	--	20.2
Farm Tractors	0.3	0.9	2.3	0.2	12.4
Sub-total (Mobile Sources)	39.9	323	321	17.6	2940
Accidental Fires	1	1.1	0.2	--	9.4
Paved & Unpaved Roads	191	--	--	--	--
Consumer Solvent Usage	--	41.7	--	--	--
Bio Degredation	--	6.4	--	--	--
Ocean Bay/Salt	42.4	--	--	--	--
**Vegetation	--	**	--	--	--
Sub-total (Other Sources)	234	49.2	0.2	--	9.4
TOTAL EMISSIONS	479	732	643	195	3220

** Vegetation emissions are about 500 t/day as estimated by ABAG for the BAAQMD

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
District Emissions By Source Categories

1987 ANNUAL AVG.
BASE YEAR 1979

	PART	ROG	TONS/DAY		
			NOX	SO2	CO
Petroleum Refining	6.4	29.6	50	47.1	4.1
Fuels -Bulk Loading	--	4	--	--	--
Fuels -Filling Stations	--	12.4	--	--	--
Printing & Coating	--	93.8	--	--	--
Solvent Degreasing	--	8.4	--	--	--
Dry Cleaners	--	6.5	--	--	--
Rubber, Plastic Products Mfg.	--	8.2	--	--	--
Other Solvent Usage	--	18.5	--	--	--
Chemical Mfg.	1.8	0.4	1	49.8	34.3
Metallurgical & Mineral Ind.	37	0.2	0.1	1.5	3.6
Construction & Demolition	115	--	--	--	--
Gas Distribution	--	21.7	--	--	--
Other Industrial/Commercial	37	23.8	3.9	7.3	6
Domestic Fuel Usage	4.4	1.1	23	0.5	8.9
Commercial Fuel Usage	1	0.2	6.8	0.2	1.3
Industrial Fuel Usage	4	1.4	76	9.2	13.1
Electrical Generating Plants	5.1	0.4	94.1	19	6.3
Waste Burning & Incineration	1.9	1.1	6.6	2.7	15.8
Lawnmowers	0.1	3.8	0.5	0.1	41.9
Construction Equipments	4.8	5.6	56	4.7	15.2
Ships	0.9	14.6	9.4	17.5	63.3
Locomotives	0.3	1.5	4.8	0.7	1.7
Other Reciprocating Engines	0.5	12.9	11.7	0.2	85.1
Sub-total(District Jurisdiction)	221	275	344	161	301
Air Carriers	4.2	4.4	8.7	0.8	15.9
General Aviation	2.7	4.7	2.1	0.2	24.5
Military Aircraft	0.4	5	1	0.2	33.1
Cars, Lt. & Med. Duty Trucks	24.5	149	146	6.4	1470
Heavy Duty Trucks & Buses	5.6	17.3	39.2	13.5	457
Motorcycles	0.2	5.2	0.4	0.1	14.4
Farm Tractors	0.2	0.7	2.1	0.2	11.9
Sub-total (Mobile Sources)	37.8	186	199	21.3	2020
Accidental Fires	1	1.2	0.2	--	9.8
Paved & Unpaved Roads	234	--	--	--	--
Consumer Solvent Usage	--	45.3	--	--	--
Bio Degredation	--	6.9	--	--	--
Ocean Bay/Salt	42.4	--	--	--	--
**Vegetation	--	**	--	--	--
Sub-total (Other Sources)	278	53.4	0.2	--	9.8
TOTAL EMISSIONS	536	515	543	182	2340

** Vegetation emissions are about 500 t/day as estimated by ABAG for the BAAQMD

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
District Emissions By Source Categories

2000 ANNUAL AVG.
BASE YEAR 1979

	PART	ROG	NOX	SO2	CO
	----	----	----	----	----
Petroleum Refining	7.5	34.4	58.4	55	4.0
Fuels -Bulk Loading	--	3.2	--	--	--
Fuels -Filling Stations	--	9.9	--	--	--
Printing & Coating	--	111	--	--	--
Solvent Degreasing	--	12.4	--	--	--
Dry Cleaners	--	9.5	--	--	--
Rubber, Plastic Products Mfg.	--	9.2	--	--	--
Other Solvent Usage	--	20.8	--	--	--
Chemical Mfg.	2	0.5	1.1	55.7	38.3
Metallurgical & Mineral Ind.	41.3	0.2	0.1	1.7	4
Construction & Demolition	124	--	--	--	--
Gas Distribution	--	24.3	--	--	--
Other Industrial/Commercial	38.6	27.8	4.4	8.2	6.7
Domestic Fuel Usage	5.2	1.4	25.7	0.6	11.3
Commercial Fuel Usage	1.1	0.3	7.6	0.2	1.5
Industrial Fuel Usage	4.5	1.5	85.3	9.9	14.6
Electrical Generating Plants	7.8	0.6	128	37.1	8.6
Waste Burning & Incineration	2.2	1.3	7.5	2.9	19.7
Lawnmowers	0.1	2.9	0.4	--	34.2
Construction Equipments	5.2	6	60.2	5.1	16.3
Ships	1	16.3	10.5	19.6	70.7
Locomotives	0.4	1.7	5.4	0.8	1.9
Other Reciprocating Engines	0.6	16.3	12.6	0.2	108
Sub-total(District Jurisdiction)	241	311	407	197	341
Air Carriers	5	3.8	11.9	1	18.3
General Aviation	9.1	11.3	5.5	0.6	58.5
Military Aircraft	0.6	7.1	1.3	0.3	47.5
Cars, Lt. & Med. Duty Trucks	37.2	150	142	9.1	1290
Heavy Duty Trucks & Buses	9.2	20.1	39.7	24.5	453
Motorcycles	0.4	5.8	0.4	0.1	14.3
Farm Tractors	0.2	0.6	1.8	0.1	10.6
Sub-total (Mobile Sources)	61.5	199	202	35.7	1900
Accidental Fires	1	1.2	0.2	--	10.4
Paved & Unpaved Roads	303	--	--	--	--
Consumer Solvent Usage	--	50.0	--	--	--
Bio Degredation	--	7.8	--	--	--
Ocean Bay/Salt	42.4	--	--	--	--
**Vegetation	--	**	--	--	--
Sub-total (Other Sources)	346	59.6	0.2	--	10.4
TOTAL EMISSIONS	649	569	610	233	2250

** Vegetation emissions are about 500 t/day as estimated by ABAG for the BAAQMD

APPENDIX F

AMENDMENT TO THE ENVIRONMENTAL IMPACT REPORT
ON THE SAN FRANCISCO BAY AREA ENVIRONMENTAL MANAGEMENT PLAN

APPENDIX F

AMENDMENT TO THE ENVIRONMENTAL IMPACT REPORT ON THE SAN FRANCISCO BAY AREA ENVIRONMENTAL MANAGEMENT PLAN

INTRODUCTION

This report is an amendment to the previous EIR for the Air Quality Plan as contained in Volume II of the Environmental Management Plan, June 1978. Amendments for 1982 are required under the 1977 Clean Air Act because the 1979 plan did not demonstrate attainment of the applicable air quality standards for ozone and carbon monoxide by 1982. EPA granted the Bay Area an extension of the attainment deadline to 1987, as permitted by the Act.

The report presents general narrative descriptions of the proposed control strategies and their impacts, followed by tables which present the information in more complete form.

DESCRIPTION OF THE PROPOSED PROJECT

Two general control strategies are proposed to improve air quality and meet the federal standards for ozone and carbon monoxide:

- o an ozone control strategy to meet the federal one-hour ozone standard by 1987; and
- o a carbon monoxide strategy to meet the federal eight-hour standard by 1987.

Both general strategies consist of a series of primary and contingency control measures which are listed in Table F-3 (see also appendices A,B,C and D), and which are discussed in general below.

Ozone Control Strategy - A reduction of 85 tons/day of hydrocarbons is required by 1987 in order to attain the federal ozone standard. To that end, a series of control measures, constituting revisions of or additions to the original hydrocarbon controls, have been recommended. The control measures are of four main types:

1. Motor vehicle inspection and maintenance (I/M) - an annual program to ensure that motor vehicles in the light-duty auto, light-and medium-duty truck classes have operating emissions controls and that they conform to prescribed standards.

2. Stationary source control measures - there are 22 such control measures proposed, including, for example, tanker ballasting (requiring segregated ballast or a washed ballast tank and an inert gas system for tankers larger than 40,000 DWT), modification of reciprocating engines (requiring replacement of two-cycle engines with four-cycle, and four-cycle engines with electric motors where possible), and pesticide controls (banning the use of weed oil and requiring the use of water or other non-VOC carriers and limiting overspray), to name a few;
3. Transportation control measures - primarily reaffirm commitments to the original transportation controls, such as supporting ridesharing, increasing mass transit ridership, and developing high occupancy vehicle (HOV) lanes;
4. Administrative programs - including, for example, advisory review of projects and plans wherein, using the existing CEQA environmental document process, the three co-lead air quality planning agencies would issue advisory comments on specific projects and would work with developers to minimize adverse air quality impacts of projects.

Carbon Monoxide Control Strategy: Unlike the regional scope of the ozone problem and its corrective measures, the objective of this localized strategy is to attain the federal eight-hour standard for carbon monoxide in three cities: San Jose, Oakland and Vallejo. Special monitoring programs have identified these cities as having exceeded the standards and, as such, they are targeted for control measures specific to the nature and extent of their CO problems. For example, in San Jose, where the CO problem is most severe, three primary measures are recommended--two of these are the aforementioned I/M and advisory review measures and the other (which is also a recommended control measure for ozone) is conformity assessment of federally supported activities (formalizing the existing federal grant application review function to specifically include conformity with the 1982 Bay Area Air Quality Plan). In Oakland, in addition to advisory review and conformity assessment, a comprehensive transportation plan and air quality analysis is recommended to assess the impact of the rapidly expanding central business district on the city's air quality. In Vallejo the trend toward lower vehicle emissions as a result of the existing California vehicle emissions program is sufficient to attain the CO standard by 1987, therefore, no additional controls are recommended.

Additional Measures Recommended by the Joint Air Quality Planning and Advisory Committee for Consideration in the Plan

1. Mandatory Indirect Source Review - this measure would require review of development projects, such as shopping centers, which generate or attract traffic. The goal would be to introduce mitigation measures which reduce

traffic congestion and minimize air quality impacts. This mandatory review process would replace the advisory review process for indirect sources above specified size criteria.

2. Land Use Controls - this strategy consists of 16 specific policies and 49 actions which would alter regionwide development patterns to reduce automobile travel by means of local and regional policies on land use and urban services.
3. Public Support for Transit - these measures are reiterated in the transportation control measures descriptions.
4. Additional CARB measures - transportation measures identified by the California Air Resources Board may provide additional strategies for local implementation.

SIGNIFICANT ENVIRONMENTAL EFFECTS OF THE PROPOSED PROJECT

Before enumerating the possible effects of the carbon monoxide and ozone amendments, it should be noted that the Regional Plan into which they fit is an integrated document to be read and applied as a whole. Specific objectives, policies and actions are to be undertaken in coordination with the balance of the plan. Taken as a whole, with the proposed amendments, the plan will not have significantly adverse environmental effects as defined by CEQA. A summary of the effects, which are also discussed briefly in the following sections, appears in Table F-3.

The overall positive effects attributable to these amendments, as they were for the control measures in the Environmental Management Plan, are summarized in Section VI and below:

- o improvement in air quality through reduction of emissions of hydrocarbons and carbon monoxide
- o improvements in public health
- o reduction in damage to vegetation
- o reduction in damage to man-made materials
- o improvements in scenic, amenities and recreational amenities

Assessments of possible adverse effects from these additional, more stringent control measures considered their impact on the following subject areas: 1. environmental resources - air quality, surface/groundwater resources, physical resources and energy resources; 2. institutional/financial resources; 3. economic resources - production of goods/services, consumer expenditures, income and investment; and 4. social welfare - housing supply, physical mobility, sense of community and equity. While each of these are discussed individually and summarized in Table F-3, an overview of the impact assessments are summarized below in Table F-1. Many of the impacts of the proposed strategies addressed in this report were discussed in both

the previous EIR for the air quality plan (see the Bay Area Environmental Management Plan, Volume II, June 1978) and in the draft Air Quality Maintenance Plan (September 1977) which preceeded it.

TABLE F-1. IDENTIFICATION OF POTENTIALLY SIGNIFICANT ADVERSE ENVIRONMENTAL EFFECTS

EFFECTS	CONTROL STRATEGY	
	<u>Ozone</u>	<u>Carbon Monoxide</u>
Environmental		
Air Quality	None	None
Surface/Groundwater	Potent. Signif.	None
Physical Resources	Potent. Signif.	None
Energy	Potent. Signif.	None
Institutional/Financial	None	Potent. Signif.
Economic		
Production of Goods, Services	Potent. Signif.	None
Consumer Expenditures	Potent. Signif.	Potent. Signif.
Income and Investment	Potent. Signif.	Not Signif.
Social		
Housing Supply	Potent. Signif.	None
Physical Mobility	None	None
Health and Safety	None	None
Sense of Community	Potent. Signif.	None
Equity	Potent. Signif.	Potent. Signif.

ENVIRONMENTAL EFFECTS

1. Air quality

The carbon monoxide and ozone control strategies would lead to attainment of the federal standards by 1987 and would, therefore, significantly improve air quality. The specific positive effects of improved air quality were mentioned previously, and will be discussed in the following subsections.

2. Surface/Groundwater

There would be no significant adverse effects on water quality or supply from the proposed amendments. Increased demand for both wastewater treatment capacity and water supply are accomodated by existing regional policies which have been subjected to extensive environmental analysis pursuant to CEQA. While localized surface runoff

problems could occur from implementation of policies presuming increased construction (e.g., HOV lanes), these would be minimized by local governments' existing surface runoff control programs and by policies of ABAG's water quality management plan. Beyond these, mitigation measures to control runoff problems would have to be addressed specifically by project developers as part of the CEQA plan approval process. Therefore, no significant adverse surface runoff effects will occur as a result of implementation of the proposed amendments.

The proposed land use measures would provide greater preservation of outlying area watersheds, estuarine systems and groundwater recharge areas. In addition, land use measures would lower per capita consumption rates of municipal and domestic water supplies due to increased development densities (e.g. smaller lawns, etc.).

3. Physical Resources

While no adverse effects would result from CO control strategies, there is a potentially significant effect from some of the ozone strategies. On the positive side, approximately 10,000 to 12,000 gallons/day of volatile organic compounds could be conserved. On the other hand, those measures requiring installation of new or modified equipment could consume a considerable amount of construction materials and other physical resources.

Land use measures would impact physical resources by reducing conversion of agricultural land to urban uses; by reducing damage to vegetation and animal life due to lower pollutant concentrations; by reducing conversion of mineral, timber, quarry and geothermal areas to urban uses; by increasing development pressure on land uniformly suited for special development purposes (e.g., airports, parks); and by less conversion of undeveloped land to urban uses which would increase regionwide preservation of critical environmental areas (e.g., prime agricultural areas, ecological habitats such as marshes, steep slopes and flood-prone areas, etc.).

Decreased hydrocarbon emissions would reduce the damage to vegetation that results from exposure to photochemical oxidants. Trees, shrubs and many agricultural crops in the Bay Area are affected by the ozone levels which occur. Adverse effects range from visible injury and discoloration of foliage, leaf drop, reduced plant vigor and growth, to total plant loss. Certain crops (snapdragons, chrysanthemums) are no longer grown here and others (graps, carnations, orchids) evidence serious damage. Grapes and ornamental plants are specialty crops grown in few other parts of the country and, as such, they are an important component of the region's economy. To realize their productive value, certain specialty crops must be grown in locations proximate to urban areas, yet many Bay Area ornamental growers have been forced to move to Half Moon Bay and Salinas to avoid air pollution damage. Improved air quality would ensure the viability of these crops and this important sector of the Bay Area economy.

4. Energy

It is possible that certain stationary source ozone control measures will adversely affect energy consumption. For particular industries these energy impacts may be significant - for example, requirements of best available control technology and, in some cases, lowest achievable emission rate may result in a net energy penalty for those industries affected. The total energy penalty from stationary source controls is difficult to estimate at this time, but it appears that the range energy penalty (expressed in terms of cost) might be from \$1 million to \$3 million per year. Table F-2, below, summarizes the relevant proposed controls and the source of their potential energy penalties.

TABLE F-2. STATIONARY SOURCE CONTROLS WITH LIKELY ENERGY PENALTIES

<u>Control Measure</u>	<u>Source of Energy Penalty</u>
Electronics Industry	Use of carbon adsorption or catalytic oxidation
Aerospace Assembly & Component Coatings Operations	Reformulation of water-based paints
Aerosol Cans	Use of inert gas or pump & stick
Coating of Plastics	Reformulation of paints to water-based or high solids
Landfill Sites	Use of gas well and header systems to collect VOC, then ducted to incinerator
Auto Refinishing	Installation of totally enclosed paint spray booths equipped with paint arresters, water curtains and/or electrical incineration and adsorption
Bakeries	Installation of direct flame or catalytic afterburners

As a mitigating factor it should be noted that existing ABAG policies in housing and transportation call for reduction in wasteful or inefficient energy consumption practices. The Regional Plan's energy policies also recommend the Bay Area Air Quality Management District adopt regulations promoting energy efficiency, recognizing that there will be energy-consumptive effects from stationary source regulations.

Transportation controls would offer the same general energy impacts as indicated in the previous EIR; gasoline savings specific to the proposed measures have been estimated to be approximately 18-19 million gallons per year from carpooling, mass transit and bicycle use, offset by minor increases in transit fuel consumption.

The land use control measures would lower per unit household energy consumption and provide overall reductions in transportation fuel consumption beyond those already cited.

Institutional/Financial Effects

1. Institutional

The governmental and other administrative structures for implementing these control measures already exist in the Bay Area - for example, the Bay Area Air Quality Management District actively enforces air pollution control programs in the Bay Area and Caltrans handles the RIDES carpool program; since the measures being proposed here are merely more stringent extensions of measures already in force, additional structures are generally unnecessary. In the case of the recommended I/M program, as was cited in the previous EIR, specific institutional arrangements for its implementation will have to be developed, since this activity is not within the current authority of any State or local agency. The CARB and/or the Bureau of Automotive Repair (BAR) would likely assume responsibility for the regulation and operation of I/M programs. Local government agencies' involvement is not anticipated. I/M programs can be directly administered by the State or franchised out to private contractors; due to the disproportionate demands on State administrative resources demonstrated by the South Coast Air Basin, a private-operated/public-monitored program may be preferable for the Bay Area.

The proposed land use measures would have a potentially significant institutional impact in that they require significant changes in planning and zoning administration-related activity (e.g., amendment of regional and local general plans, zoning ordinances and subdivision regulation revisions, etc.). Also, greater coordination would be needed among local agencies whose decisions affect development, and increased governmental coordination and technical support would be required in order to facilitate local action.

2. Financial

Increased costs to the Bay Area Air Quality Management District may be 6% of the District's budget, or \$600,000/year. Other local government costs are minimal, except for landfill sites which are unknown at this time.

Economic Effects

1. Production of Goods/Services

Increased technological dependence by the Bay Area industrial sector to improve regional air quality will require substantial capital investment. In some instances, these added restrictions and costs will adversely affect the competitive position of local industries inter-regionally where the cost of these investments may be passed on to the consumer. Measures for ozone control that pertain to coatings, waste disposal and consumer solvents will require that process changes occur in order to reduce levels of air pollution. Changed product composition resulting from different processes may cause reduced durability and increased liability potentials. Phased implementation of this program may help minimize these problems. In addition, special consideration may be needed for the food processing industry in meeting health standards.

The implementation of I/M measures would add a new line of service for the California automotive service industry. Although some services for identifying defective emission control equipment on cars presently exist, they are not universally applicable to all California registered vehicles. I/M programs for light-, medium- and heavy-duty vehicles would offer a universally applied service program for identification and repair of vehicles with excessive emissions caused by maladjusted or defective emission control equipment.

Transportation control measures would provide new employment in the transit sector, with the possibility of adverse effects on parking lot operators.

Land use measures, in addition to supporting the benefits of transportation controls, would increase job opportunities and commercial activities in urban areas, meaning less commercial growth in outlying areas.

2. Consumer Expenditures

Direct costs of implementing the stationary source control measures will initially fall upon industry, but will eventually be paid for by the consumer and local taxpayer. This type of expenditure will not increase productivity, but will cause inflationary activity. Higher prices for Bay Area products may cause non-Bay Area consumers to look elsewhere for the same product. In either case, the proposed controls will ultimately result in increased cost of consumer goods. In addition to the aforementioned indirect consumer costs, control measures such as I/M programs may result in direct cost increases to consumers, as they must replace faulty or noncompliant emission control devices. The average cost of the I/M inspection is \$15 per vehicle, and the average cost of repairs for the failed vehicle is approximately \$30.

Transportation controls will continue to result in both increased costs to those operating private autos, and savings to those commuters utilizing carpools, vanpools or transit.

Land use controls could increase housing prices and rents for a short time due to any production lags that might occur as builders adjust to zoning and subdivision regulations changes. There may also be increases in urban area property taxes in order to support services to new developments, and due to increased land values. Reductions in residential waste collection charges and residential and commercial energy charges would also be expected. Land use controls could shift housing demand outside the Bay Area and affect consumer housing preference in other ways as well. Finally, such controls could mean more disposable income due to lower transportation costs.

3. Income and Investment

The costs for implementing the recommended control strategies are summarized in Table F-3.

Land use control measures would have the effect of lowering regionwide demand for investment due to reduced public capital requirements. Such measures would also shift the emphasis of public and private financial investment for renovation and replacement from outlying to urban areas. Residential land prices could increase in urban centers and decline in outlying areas. Housing rehabilitation and maintenance industries as well as higher density residential production would be stimulated. The housing industry's profit/cost structure may also be affected. Industrial land prices would not be significantly impacted due to the large industrial land supply within urban areas.

Social Welfare Effects

1. Housing Supply

The potential impact on housing supply comes from the proposed land use measures which, if implemented, could: increase conversions of older urban area single-family structures; lower the proportion of substandard units regionwide due to rehabilitation/redevelopment efforts; cause a temporary lag in new urban residential construction as builders adjust to zoning and subdivision regulation changes; reduce new residential construction in outlying areas within the region; and increase new construction and rehabilitation activity throughout urban areas, particularly older development areas.

2. Physical Mobility

Neither general strategy would involve additional impacts on physical mobility beyond those identified in the previous EIR which would result from the transportation and land use control measures. These impacts include: additional transit service and carpool/vanpool availability increasing commuters' options for mobility; increased pedestrian activity as urban services are brought within closer

proximity; decreased regionwide total vehicle miles traveled; shorter trips by automobile, resulting in travel time savings; a possible increase in local traffic congestion as local streets are used more; and greater inconvenience for private automobile users (e.g., parking difficult to find).

3. Health and Safety

Except for carbon monoxide "hot spots", the only air quality standard not met in the Bay Area is the 0.12 ppm ozone standard - since the implementation of these recommended control strategies would reduce hydrocarbon emissions and, therefore, ozone impact, there will be an improvement in public health as was identified in the previous EIR. The benefits noted there (e.g., decreased mucous membrane irritation, respiratory distress, health impairment of high risk populations, etc.) would continue and be expanded as standards are gradually met. Improvements in safety, as noted in the previous EIR (e.g., decreased traffic accidents from transportation controls, elimination of hazards associated with the use and storage of combustible solvents from stationary source controls), would also continue and be improved as the recommendations in these amendments are implemented. On the negative side, the only adverse effects could result from land use controls which could produce increased pedestrian safety problems on local streets, and possibly greater exposure to localized CO pollutant concentrations, depending on the success of technological controls and the amount of increase in use of transit.

4. Sense of Community

There are no adverse effects on the sense of community, with the possible exception of land use measures which could result in higher density development. On the other hand, the very same land use measures could also enhance neighborhood identities, due to the diversity and density of activities, and could increase time for non-work activity (i.e., time perhaps spent in the community) due to shorter commutes.

5. Equity

A major question of equity involves the competitive position of Bay Area industries that are placed under the proposed stationary source restrictions and controls. Employment opportunities created in local industries producing air pollution control equipment will not offset increased unemployment resulting from the competitive disadvantage (see "Production of Goods/Services"). The willingness of EPA and CARB to require similar measures outside of the Bay Area is of obvious concern to the region.

In addition, the I/M program will adversely impact some groups in urban areas more severely than others, particularly those with limited incomes. Older vehicles generally need more extensive repairs--costing as much as \$150 or more. This may place a special financial burden on lower-income persons, who are more likely to own older vehicles. The possible consequences of an I/M program might be: a) an increased incidence of motorists driving without valid registration; b) greater

use of public transportation; and c) reduced mobility for low-income persons who have no access to public transportation.

With regard to transportation controls, the previous EIR identified equity issues which are still applicable--the additional transit services will particularly benefit low income, handicapped and other persons who depend on mass transit, and pricing disincentives will influence commuters (primarily middle income) who choose to continue driving their cars.

Finally, the equity issues related to land use measures as identified in the previous EIR (e.g. expanded transit and broadened housing opportunities on the positive side and, on the negative side, displacement of poor, aged, minority, and handicapped residents of areas undergoing rehabilitation and redevelopment, and budget impacts of those on low and fixed incomes due to cost of living increases in renewed areas) would still be applicable and of concern.

ALTERNATIVES TO THE PROPOSED ACTION

The No Action Alternative to the 1982 Bay Area Air Quality Plan

The major alternative to the 1982 Bay Area Air Quality Plan in its entirety is one of no action. The Clean Air Act Amendments of 1977 requires each State to prepare State Implementation plans identifying how ambient air quality standards will be met, and set forth specific requirements for those plans, which the 1982 Bay Area Air Quality Plan attempts to satisfy. No action would mean that the Bay Area's air quality would not meet health-based national standards, and that the Bay Area would not comply with the requirements of federal law, therefore becoming subject to continuation of specific sanctions (penalties) identified in the Clean Air Act and enforced by EPA. These sanctions include a ban on construction of new or modified major sources of air pollution, and withholding of federal funds for specific highway and sewage treatment projects and air pollution control grants.

Contingency Measures

In addition to the primary control measures designed to meet the goals of the two general strategies, there are contingency measures for each which will be implemented if it appears likely that the federal standards for ozone and/or carbon monoxide will not be attained using the primary controls alone. The contingency measures have been summarized in Appendices A and B to the Plan.

Measures Not Reasonably Available

In the process of generating and analyzing options for air pollution control measures which would lead to attainment of the federal standards, there were several which, for various reasons, were deemed not to be reasonably available and were therefore, eliminated from further consideration. These options are presented, along with the rationale for their elimination, in Appendix D to the Plan.

RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The proposed amendments would have significant benefits for the maintenance and enhancement of long-term productivity, in keeping with those of the air quality plan as a whole. In reviewing the potential impacts of each strategy on the primary subject areas of concern (e.g., environment, economy, society, etc.) it is clear that the control measures involved will provide positive impacts which will serve to balance out the potential short-term negative impacts.

Of particular significance, and fundamental to the rationale for air quality improvements, are the benefits to be enjoyed as the public health and welfare are improved.

The health and welfare problems which have been linked to air pollution carry enormous potential for decreasing the long-term productivity of the people, plants and animals in the environment. Therefore, these additional control measures, in conjunction with those already in existence, will move the Bay Area towards attainment of the standards which have been deemed necessary in order to protect the health of people and the environment.

ANY SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES WHICH WOULD BE INVOLVED IN THE PROPOSED ACTION SHOULD IT BE IMPLEMENTED

The policies of the proposed amendments, like those of the 1979 Plan, should not result in irreversible changes to the environment. Implementation of these actions would generally reduce or eliminate the significant irreversible environmental changes that would result if air quality is not improved (e.g., deterioration of physical resources, such as vegetation, and public health). Federal air quality standards seek, in part, to protect and enhance environmental quality.

THE GROWTH INDUCING IMPACTS OF THE PROPOSED ACTIONS

The 1982 Bay Area Air Quality Plan should not have growth inducing effects.

TABLE F-3. SUMMARY OF PROPOSED CONTROL MEASURES AND THEIR IMPACTS

TABLE F-3. SUMMARY OF PROPOSED CONTROL MEASURES AND THEIR IMPACTS

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
I. MOTOR VEHICLE INSPECTION AND MAINTENANCE						
Implement annual inspection/ maintenance program to ensure that motor vehicles in the light-duty auto, light- and medium-duty truck classes have operating emissions controls and that they con- form to prescribed emissions standards.	Carbon monoxide: 480 Hydrocarbons: 41	California Department of Consumer Affairs	A-1984 I-1987	\$77,000,000	-State General Fund -I/M Program Revenues	New legisla- tion re- quired.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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Air Quality

- o See "Direct Benefits" column.

Water Quality

- o No impact.

Physical Resources

- o Reducing emissions of air pollutants will have a beneficial impact on vegetation and other man-made materials which are currently being damaged by such pollutants. These beneficial effects will result from this strategy as well as the others being proposed in this plan.

Energy Resources

- o No impact.

Institutional

- o Specific institutional arrangements will have to be developed, since I/M is not within the current authority of any State or local agency. The California Department of Consumer Affairs would likely assume responsibility for the regulation and operation of these programs. Local government agencies' involvement is not anticipated.

- o I/M programs can be directly administered by the State or franchised out to private contractors; due to the disproportionate demands on State administrative resources demonstrated by the South Coast Air Basin, a private-operated/public-monitored program may be preferable for the Bay Area.

Financial

- Direct Public Cost of Implementation
 - o See column headed "Total Cost/Year of Recommended Action".

- Fiscal Effect on Local Government
 - o No impact.

Production of Goods and Services

- o Implementation of I/M measures would add a new line of service for the California automotive service industry. Some services presently exist for identifying defective emission control equipment, but they are not universally applicable to all California registered vehicles. I/M programs for light-, medium-, and heavy-duty vehicles would offer a universally applied service program for identification and repair of vehicles with excessive emissions caused by maladjusted or defective emission control equipment.

Consumer Expenditures

- o I/M consumer costs are comprised of the inspection fee and related maintenance and repair costs which may be incurred. The inspection fee will probably not exceed \$15, and the average cost of repairs for the failed vehicle is approximately \$30.

Income and Investment

- o See private costs in the column headed "Total Costs/Year of Recommended Action."
- o Improved maintenance may prolong vehicle life.

Housing Supply

- o No impact.

Physical Mobility

- o Because of the increased cost of private transportation, the mobility of the limited income segment of the Bay Area population may be reduced, particularly for those in other than urban areas.

Health and Safety

- o The substantial reduction in emissions of carbon monoxide and hydrocarbons from this measure could produce substantial health-related benefits, particularly for high risk groups and those who experience the heaviest exposures while residing, working or shopping in urban centers.

Sense of Community

- o No impact.

Equity

- o Older vehicles generally need more extensive repairs; this may place a special financial burden on lower-income persons who are more likely to own older vehicles.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
II. STATIONARY SOURCE CONTROLS						
1. Tanker Ballasting: Use segregated ballast or washed ballast tank and inert gas system for tankers larger than 40,000 DWT	2.5	U.S. Coast Guard	A, I-1981	No direct costs	Administrative/ Regulatory -ad valorem tax revenues -ARB subvention funds -Federal Clean Air Act funds -permit fees	The Bay Area Air Quality Management District (BAAQMD) was created by the California Legislature in 1955. The Dis- trict structure, operating pro- cedures and authority are co- tained in Divi- sion 26 of the California Health and Safety Code.
2. Reciprocating Engines: Replace 2-cycle engines with 4-cycle; replace 4-cycle engines with electric motors where possible	4.0	Bay Area Air Quality Manage- ment District (BAAQMD)	A, I-1986	\$290,000	Operating/ Maintenance -private	
3. Gasoline Distribution: Lower exemption cutoffs to require Phase I, II controls at additional service stations	1.0	BAAQMD	A-1983 I-1984	\$180,000	Capital -private -California Pollution Control fi- nancing authority	
4. Pesticides: Ban weed oil; use water or other non-VOC carriers; limit overspray	3.7	BAAQMD	A-1985 I-1986	\$530,000	-Federal Small Business Ad- ministration loan programs	
5. Wood Furniture Coating: Use low solvent coatings and high transfer efficiency spray methods	1.1	BAAQMD	A-1983 I-1984	\$200,000		
6. Electronics Industry: Use condensation, adsorption, etc. to control solvent emissions	5.7	BAAQMD	A-1982 I-1983	\$3,800,000		
7. Organic Chemical Manufacturing: Requires control of VOC fugitive emissions from pumps, compressors, process vessel depressurization and process relief valves	0.3	BAAQMD	A-1983 I-1984	\$58,000		
8. Aerospace Assembly & Component Coating Operations: reformulate paints by converting to waterbased or high-solids paints or substituting non-reactive solvents for reactive ones in conventional paints	0.5	BAAQMD	A-1982 I-1984	\$180,000		
9. Aerosol Cans: Use pump, stick or roll-on containers or N ₂ /CO ₂ propellants. Reduce VOC content/reactivity.	3.0	BAAQMD	A-1985 I-1986	\$600,000		
10. Coating of Plastics: Use low-solvent coatings or equivalent control by condensation, adsorption, incineration, etc.	2.0	BAAQMD	A-1984 I-1985	\$730,000		
11. Industrial Maintenance Coatings: Use low-solvent coatings for some industrial maintenance applications	1.0	BAAQMD	A-1984 I-1985	\$370,000		
12. VOC Storage: Lower control requirement cut-offs from 1.5 psia and 40,000 gallons to 0.5 psia and/or 10,000 gallons	3.0	BAAQMD	A-1984 I-1985	\$990,000		

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> - o See "Direct Benefits" column. <u>Water Quality</u> - o No impacts. <u>Physical Resources</u> - o Conservation of 10,000 to 12,000 gals/day of volatile organic compounds. (Approx. \$4 million per year.) - o Some rules (best available control technology) would consume construction materials, water, disposal facilities, etc. <u>Energy Resources</u> - o Use of BACT (5 or 6 measures) and, in some cases, lowest attainable emission rate (1 or 2) may result in a net energy penalty. <u>Public Facilities</u> - o No serious impact other than landfill sites which may use land owned by either public or private parties.	<u>Institutional</u> - o The governmental structure for implementing these control measures already exists in the Bay Area Air Quality Management District (BAAQMD) which actively enforces air pollution control programs in the Bay Area. The proposed amendments are an expansion of existing organic emission rules to cover new categories of sources, or are more stringent extensions of measures already in force for control of industrial and stationary sources of air pollution. <u>Financial</u> Direct Public Costs of Implementation - o See "1982 Costs of Recommended Control Actions" column; annualized costs of \$24 million to \$62 million per year. Fiscal Effects on Local Government - o Increased costs to BAAQMD may be 6% of District's budget, or \$600,000/year. Other local governmental costs are minimal except for landfill sites, which are not clear at this time. The governmental structure for the implementation of these control measures already exists in the Bay Area Air Quality Management District, as mentioned above.	<u>Production of Foods and Services</u> - o Increased technological dependence by the Bay Area industrial sector to improve regional air quality will require substantial capital investment. In some instances, these added restrictions and costs will adversely affect the competitive position of local industries inter-regionally where the cost of these investments may be passed on to the consumers. - o Measures pertaining to coatings, waste disposal and consumer solvents will require that process changes occur in order to reduce levels of air pollution. Changed product composition resulting from different processes may cause reduced durability and increased liability potentials. Phased implementation of this program may help minimize these problems. - o Special consideration may be needed for the food processing industry in meeting health standards. <u>Consumer Expenditures</u> - o Direct costs of implementing these measures will initially fall upon industry but eventually be paid by the consumer and local taxpayer. This type of expenditure will not increase productivity but cause inflationary activity. Also, higher prices for Bay Area products may cause non-Bay Area consumers to look elsewhere for the same product. In either case, the proposed controls will result in increased cost of consumer goods. <u>Income and Investments</u> - o See column "1982 Costs of Recommended Control Action."	<u>Housing Supply</u> - o No impacts. <u>Physical Mobility</u> - o No impact. <u>Health and Safety</u> - o Air quality standards for each of the pollutants are based upon scientifically derived air quality criteria. Air quality criteria are an expression of current information concerning the relationship between various concentrations of pollutants in the air and their adverse effects on man and his environment. The control measures being proposed are designed to meet the standards, i.e., to reduce the concentration of various pollutants in the air. Pollutant concentration reductions from the air will reduce potentially adverse effects from these substances, thereby favorably impacting public health. - o With regard to safety, the stationary source control program may eliminate many hazards associated with the use and storage of combustible solvents. <u>Sense of Community</u> - o No impact. <u>Equity</u> - o A major question of equity involves the competitive position of Bay Area industries that are placed under the restrictions and controls proposed. Employment opportunities created in local industries producing air pollution control equipment will not offset increased unemployment resulting from the competitive disadvantage (see "Production of Goods and Services"). The willingness of EPA and CARB to require similar measures outside of the Bay Area is of obvious concern to the region.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
11. STATIONARY SOURCE CONTROLS (Cont'd.)						
13. Large Commercial Bakeries: Control oven VOC emissions from large commercial bakeries	1.1	BAAQMD	A-1985 I-1986	\$400,000		
14. Marine Lightering: Use deep draft lighter vessels to reduce VOC emissions.	0.6	U.S. Coast Guard	A-1985 I-1986	\$220,000		
15. Zero Gap Seals on Floating Roof Tanks: Install "zero gap" seals on most floating roof tanks	1.5	BAAQMD	A-1984 I-1985	\$22,000		
16. Polymer & Resins Manufactur- ing: Use condensation, ad- sorption to control VOC emissions from reactor vessels, etc.	0.2	BAAQMD	A-1984 I-1985	\$120,000		
17. Rubber /Plastic Products Manu- facturing: Use condensation, adsorption or incineration to control VOC emissions from molding, curling, cementing, etc.	1.1	BAAQMD	A-1984 I-1985	\$640,000		
18. Coatings Manufacturing: Re- quires control of VOC emis- sions from reactors, blenders, mixers, and transfer and storage	0.2	BAAQMD	A-1984 I-1985	\$150,000		
19. Natural Gas & Crude Oil Production: Requires con- trol of VOC emissions from valves, flanges, pumps, com- pressors, relief valves and storage tanks	1.6	BAAQMD	A-1983 I-1984	\$440,000		
20. Sanitary Landfill Sites: In- stall gas collection systems to be combusted directly or separated into a saleable methane portion and non-methane portion to be incinerated	7.2	BAAQMD	A, I-1983	\$9,500,000		
21. Vegetable Oil Manufacturing: Use mineral oil scrubber and proper maintenance/operation per draft EPA CTG for ex- tractors, desolventizers, dryers, coolers and conveyers	0.4	BAAQMD	A-1984 I-1985	\$150,000		
22. Volatile Organic Waste Dis- posal: Strip and recover VOC from wastes prior to disposal	6.0	BAAQMD	A-1983 I-1985	\$5,200,000		

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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See preceding page.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
III. TRANSPORTATION CONTROLS						
1. Reaffirm commitment to 28% transit ridership increase between 1978 and 1983.	Included in 1979 Air Quality Plan - no additional credits are claimed.	Metropolitan Transportation Commission (MTC), transit districts.	Measure is currently being implemented, with a 26% increase in ridership resulting in the first 3-year period.	Included in Transportation Improvement Program - no additional costs.	-Federal Mass Transportation Assistance Program -Fare Revenues	-Local Transit District Enabling Legislation -MTC Enabling Legislation
2. Support post-1983 improvements identified in public transit operators' 5-year plans; after consultation with the operators, adopt ridership increase target for 1983-1987.	Hydrocarbons: 0.6 Carbon Monoxide: 7.3 Nitrogen Oxides: 1.0		A-1982 I-continuing	Costs of maintaining existing level of services is currently programmed in regional allocations. Ridership increases would come from productivity improvements, thus additional costs would be moderate.	-Local Transportation Development Act Funds -State Mass Transportation Assistance Programs -Toll Bridge Revenues	
3. Seek to expand and improve public transit beyond committed levels.	Hydrocarbons: 0.3 Carbon Monoxide: 3.8 Nitrogen Oxides: 0.5		MTC seeks new sources of revenue on an ongoing basis; if funding exists, transit operators implement plans to expand services.	Transit operators have submitted capital requests for FY83-87; of these, \$119.4 million cannot be funded with currently anticipated revenues. Additional funds would also be needed for operating subsidies. However, this measure has other benefits so the costs cannot be solely attributed to air quality.		
4. Continue to support development of high-occupancy-vehicle (HOV) lanes.	Depends on specific project. Emission credits would not be allowed for specific projects until environmental studies were completed and funds were programmed.	Caltrans, cities and counties	A-1979 I-varies with the project	Varies by specific project; since these projects have other benefits, the costs cannot be solely attributed to air quality.	-Federal Aid Highway Programs -State Highway Program Funds	-Caltrans enabling legislation -Local planning and traffic control enabling legislation
5. Continue to support RIDES efforts; carpool matching and vanpooling.	Emissions credits already included in 1979 Plan - no additional credit is claimed.	RIDES, MTC, Caltrans	A-1979 I-continuing	Funds are already programmed; no additional costs are associated with this measure.	-Federal Aid Highway Programs -State ride-sharing funds	-Caltrans enabling legislation -RIDES charter -MTC enabling legislation
6. Continue efforts to obtain funding to support long range transit improvements (including a light rail line in the Guadalupe Corridor and various BART extensions).	It is likely that none of the projects included in this measure can be implemented prior to 1987, hence no emissions credits are claimed.	MTC, transit districts	A-1979 I-continuing	Project design costs over the next 5 years total \$35 million; construction costs of the Guadalupe project over the next 5 years is \$181 million. ¹	Same as #1.	Same as #1.
7. Reaffirm commitment to preferential parking program; opening more fringe parking lots and free vanpool parking areas.	Emissions credits already included in 1979 Plan - no additional credit is claimed.	Caltrans	A-1979 I-continuing	Costs already included in the Transportation Improvement Program; no additional costs are associated with this measure.	Same as #5.	-Caltrans enabling legislation

1. Due to the range of benefits from these measures the costs cannot be attributed solely to air quality.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
<u>Air Quality</u> - o See "Direct Benefits" column. <u>Water Quality</u> - o No impact. <u>Physical Resources</u> - o No impact other than the reduction in damage to vegetation and man-made materials associated with lower pollutant emissions. <u>Energy</u> - o Gasoline savings estimated to be 18-19 million gallons/year from carpooling, the shift to transit, improved traffic flow, and the shift to bicycles.. - o Minor increase in transit fuel consumption. <u>Amenities</u> - o Cleaner air. - o Improved pedestrian environment in auto-control zone.	<u>Institutional</u> - o Organizational and governmental structures necessary to implement these measures are already in existence and, as these are continuations of previously adopted measures, progress in their implementation is already ongoing. <u>Financial</u> - o Certain measures, notably the additional transit services, bus/carpool lanes, and bicycle systems, are rather costly. There is some funding available, but additional funds will be needed. - o Other measures would generate revenue which could be used to finance the incentives mentioned above.	<u>Production of Goods and Services</u> - o New employment in the transit sector. - o Possible adverse effect on parking lot operators. <u>Consumer Expenditures</u> - o Increase in cost of operating private autos. - o Savings to those commuters utilizing carpools, vanpools or transit.	<u>Housing Supply</u> - o No impact. <u>Physical Mobility</u> - o Additional transit service would increase mobility of all transit users. - o Carpool/vanpool measures would increase travel options for most commuters. - o Some restriction on private auto access in the auto control zone. <u>Health and Safety</u> - o Reduction in auto accidents with improved peak period flow. - o Exercise benefits for those who bicycle. - o Possible increase in number, but not rate, of bicycle accidents with increased usage. <u>Sense of Community</u> - o No impact.
			<u>Urban Patterns</u> - o The combination of incentives like additional transit service and disincentives on private auto use will encourage a more compact land use pattern, with employees living closer to transit lines and/or their jobs. - o Pricing disincentives will impact primarily middle income commuters who choose to continue driving their cars.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
III. TRANSPORTATION CONTROLS (Cont'd.)						
8. Encourage transit operators to work with Caltrans to identify underutilized lots along major transit lines which could be used as park-and-ride lots.	Hydrocarbons - <0.1 Carbon Monoxide - 0.5 Nitrogen Oxides - 0.1	Caltrans, transit districts	A-1979 I-continuing	Equivalent annual cost of this measure is \$22,850.	-State Highway Program funds	Same as #7.
9. Continue present Commute Alternatives Program: informing employers of transportation alternatives and training commute coordinators within a firm to promote the goals of the program.	Hydrocarbons - 0.1 Carbon Monoxide - 0.9 Nitrogen Oxides - 0.1	MTC	A-1979 I-continuing train 30 commute coordinators each year	Equivalent annual cost is \$35,420.	-Federal Mass Transit Assistance Programs -Local Transportation Development Act funds -State Ridesharing funds	-MTC enabling legislation
10. Encourage cities to change regulations to decrease parking requirements for employers who encourage car/vanpooling.	Hydrocarbons - 0.1 Carbon Monoxide - 1.5 Nitrogen Oxides - 0.2	MTC, cities and counties	A-1979 I-continuing	Equivalent annual cost is \$13,700 ¹	-Local Transportation Development Act funds -City General Funds	-Municipal zoning enabling legislation
11. Complete the bicycle element of the MTC Regional Transportation Plan: Implement plans to facilitate bicycle usage.	Hydrocarbons - 0.4 Carbon Monoxide - 5.4 Nitrogen Oxides - 0.1		A-1982 I-1982-84	Equivalent annual cost is \$2,100,000 ¹	-Local Transportation Development Act funds	-TDA legislation
12. Continue MTC Commute Alternatives Program and place additional emphasis on flextime program which allows employees to choose travel times, hence avoiding congestion.	Hydrocarbons - 0.4 Carbon Monoxide - 5.0 Nitrogen Oxides - 0.3	MTC	A-1979 I-continuing	Equivalent annual cost is \$13,800 ¹	Same as #9.	Same as #9.
13. Encourage cities to use CEQA review procedures to restrict the development of commercial drive-through facilities.	Hydrocarbons - 0.1 Carbon Monoxide - 1.3 Nitrogen Oxides - <0.1	MTC, cities and counties	A-1979 I-continuing	No additional costs are associated with this measure.	-MTC planning funds -City General Funds	-Municipal zoning enabling legislation -California Environmental Quality Act
14. Encourage large delivery fleet operators to restrict vehicle idling either through company policy or the use of vehicle controls.	Hydrocarbons - <0.1 Carbon Monoxide - 0.1 Nitrogen Oxides - <0.1	MTC, fleet operators	A-1979 I-continuing	Equivalent annual cost is \$4,100.	-MTC planning funds -Private funds	-MTC enabling legislation
15. Disseminate information on the economic and technical benefits of alternative engines and fuels to fleet operators in the Bay Area.	Hydrocarbons - <0.1 Carbon Monoxide - 0.1 Nitrogen Oxides - <0.1		A-1982 I-1982-84	Equivalent annual cost is \$4,100.		

¹ Due to the range of benefits from these measures the costs cannot be attributed solely to air quality.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
See preceding page.			

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPE- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
IV. ADMINISTRATIVE PROGRAMS						
1. Advisory Review of Projects and Plans: This program is directed toward new or modified facilities, both public and private, and plans that could result in significant impacts on air quality. The three co-lead air quality planning agencies would review plans and proposals and issue comments related to minimizing their adverse air quality impacts as early in the planning stages as possible. The existing California Environmental Quality Act environmental document process would be used as the primary vehicle for receiving information and communicating advisory comments.	Unknown	Association of Bay Area Governments, Metropolitan Transportation Commission, Bay Area Air Quality Management District	A, I-1982	Unknown	-co-lead air quality planning agencies, existing budgets	-Under CEQA any interested parties may participate in the review-and-comment process -This process, being strictly advisory, would not require further legal authority
2. Conformity Assessment of Federally-Supported Activities: As the area-wide clearinghouse for all Federal grant applications, ABAG's Executive Board comments on Federal grant applications for conformity with regional policies, including provisions of the air and water quality management plans. Hence, assessment of conformity with the provisions of Sections 176(c) and 316 of the Clean Air Act would be formally incorporated into this process. Section 176(c) mandates that agency activities be in conformity with approved plans, and Section 316 outlines the consequences of failure to do so.	Unknown	Association of Bay Area Governments	A, I-1982	Unknown	-existing budgets	-Authority for grant application clearinghouse responsibilities comes from the Federal Intergovernmental Cooperation Act and the Federal Demonstration Cities and Metropolitan Development Act
3. Comprehensive Transportation Plan and Air Quality Analysis of Oakland Central Business District (CBD) Development: Downtown Oakland is currently projected to experience significant growth in the Central Business District which may have adverse impacts on traffic circulation and local air quality. Even with an Inspection/Maintenance Program, the Federal 8-hour CO standard may ultimately be exceeded. Therefore, a study of the collective impacts of this growth on traffic circulation and transit use, which will result in the development of mitigation strategies, is recommended as an action that the City of Oakland should undertake.	Unknown - Carbon monoxide levels are of concern	City of Oakland, ABAG, BAAQMD, and MTC	A-1982 I-1983	Unknown	-City of Oakland to fund the transportation assessment portion with ABAG, BAAQMD, and MTC assisting in preparation of the air quality assessment	-None needed

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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The environmental impacts of these programs is difficult to assess at this time in other than general terms.

As the programs involve prevention of adverse effects on environmental quality (including air, water, energy, physical resources, etc.) through studies, advisory review and conformity assessment, it is anticipated that substantial environmental benefits could result. These benefits are heightened by the fact that the programs result in a comprehensive analysis of both the individual and collective impacts of regional activities with environmental consequences, rather than fragmented analyses and recommendations from several different agency review processes. Thus, the reviewee benefits by advice and assessments, and the reviewers benefit by focusing on major environmental problems together.

Institutional

- o Both of the first two administrative programs utilize institutional structures and policies that are already in existence, and into which these proposed activities fit easily
- o Where necessary, special relationships would be established with local jurisdictions having air pollution control problems which require individual attention, such as the Oakland CO problem targeted by the third proposal.

Financial

- o As the first two proposed administrative activities are merely more formalized versions of activities that are currently being done by the agencies indicated, there would be no impact on their financial resources.
- o The impact study of the Oakland CBD would require city funds, which would likely be diverted from other potential uses.

As with the environmental impacts, the economic and social impacts of these programs is difficult to assess at the outset. The existence of coordinated, comprehensive regional plans whose purpose is to minimize adverse and maximize positive effects on economic, social and environmental resources provides a framework within which these two administrative programs will function. Consequently, the review process and comments utilized on these programs will reflect these adopted regional policies and will result in minimal negative and maximal positive impacts on the various resources of concern.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPE- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
V. ADDITIONAL MEASURES RECOMMENDED BY THE JOINT AIR QUALITY PLANNING AND ADVISORY COMMITTEE FOR CONSIDERATION IN THE PLAN						
1. Mandatory Indirect Source Review: Would require review of development projects which generate or attract traffic in order to introduce mitigation measures which reduce traffic congestion and minimize air quality impacts as early in the planning process as possible. This mandatory process would replace "Advisory Review of Projects and Plans" for indirect sources (those which produce no significant air contaminant emissions themselves, but do attract directly-polluting sources such as increased traffic density) above specified size criteria.	Not quantifiable at this time; reductions could approach 50% of those estimated for the "Compact Growth Scenario"	BAAQMD	A, I-1983	Unknown	Existing budgets	Existing authority contained in California Government Code, Health and Safety Code, State Constitution and relevant Federal legislation.
2. Land Use Control Measures: As these measures were assessed in the previous EIR, only the general policies will be summarized here - refer to Appendix C for more complete information on specific actions to implement these policies.	Unknown	Cities, counties, Local Agency Formation Commissions, special districts, ABAG, MTC, BAAQMD, State Water Resources Control Board, California Department of Transportation, U.S. Department of Transportation, Environmental Protection Agency	A, I-variable	Direct administrative and regulatory costs to be estimated when agencies specify actions they will take to carry out recommendation for compact development.	Depends on specific actions.	Existing authority contained in California Government Code, Health and Safety Code, State Constitution and relevant Federal legislation.
a. Extend new development only to those locations with existing sewer and water service or sewer and water service committed in capital improvement programs.						
b. Restrict development outside urban service areas in areas of critical environmental concern (environmental resources, hazards or amenities).						
c. Develop unimproved land within urban service areas where urban services exist or are committed in capital improvement programs.						
d. Complete, as soon as possible, all needed sewer, water or transportation improvements within adopted urban service areas.						

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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The environmental, economic and social impacts of a mandatory indirect source review process are difficult to assess at the outset. In general, however, the intent of the review process would be to predict and mitigate negative impacts in each of these three areas. As a result, it is possible that some accommodations to development plans would have to be made and, depending upon the nature of the accommodation, a range of impacts are possible. While it is not possible to predict these now, the review and comment process would deal with them as they are identified.

This measure would help to achieve attainment and long term maintenance of Federal standards for carbon monoxide, ozone and particulates. To the extent that this preventive approach is successful, benefits to the environment, economy and society would be produced.

Institutional

- o Cooperation of local governments and transit agencies would be essential for effective implementation of some mitigation measures.
- o Implementation would require either the creation of a new category of Authority to Construct permits to be issued to applicant developers by the BAAQMD, or as an alternative mechanism, each city and county in the District could amend its building permit regulations to include air quality requirements according to uniform standards (in this case, local applications would be reviewed by BAAQMD or by the three co-lead air quality planning agencies; comments on the permits would then be forwarded to the cities and counties for their final permit actions).

See "Environmental Impacts" statement

Air Quality

- o See "Direct Benefits" Column.

Water Quality

- o Would provide greater preservation of outlying area watersheds, estuarine system and groundwater recharge areas.
- o Would lower per capita consumption rates of municipal and domestic water supplies due to increased development densities (e.g., smaller lawns, etc.).
- o Would provide regionwide reduction in surface runoff pollution due to less impervious surface coverage (streets, highways, rooftops, etc.).
- o Would mean higher localized surface runoff pollution in urban areas due to increased densities.

Physical Resources

- o Less conversion of undeveloped land to urban uses would increase regionwide preservation of critical environmental areas (e.g., prime agricultural lands, ecological habitats such as marshes, steep slopes and flood-prone areas).
- o Would reduce conversion of agricultural land to urban uses.
- o Would reduce damage to flora and fauna due to lower pollutant concentrations.
- o Could reduce conversion of mineral, timber, quarry and geothermal areas to urban uses.
- o Could increase development pressure on land uniquely suited for special development purposes in urban areas (e.g., airports, parks).

(continued, next page)

Institutional

- o Would mean significant changes in planning and zoning administration-related activity (e.g., amendment of regional and local general plans, zoning ordinances and subdivision regulation revisions, etc.).
- o Greater coordination would be needed among local agencies whose decisions affect development.
- o Would require increased governmental coordination and technical support to facilitate local action.

Financial

- o Greater use of excess capacity in urban public service facilities (e.g., sewers, schools, etc.) may result in lower user charges, taxes, etc.
- o Would mean a major reduction regionwide in capital construction costs due to limited extension of public services (e.g., highways, sewer collectors, water lines, etc.).
- o More efficient solid waste collection due to higher densities could result in lower collection costs.
- o Would increase tax base for urban areas.
- o Individual property tax assessments may increase, then level off.
- o Sales tax revenue would be increased in urban centers.
- o Increased government administration costs would be expected.
- o Fee and user charges may increase in certain outlying areas.

Production of Goods and Services

- o Would be conducive to increased transit service.
- o Would increase transit-related employment.
- o Would increase job opportunities in urban areas.
- o Would increase commercial activities in urban areas.
- o Would mean less commercial growth in outlying areas.

Income and Investment

- o Would lower regionwide demand for investment due to reduced public capital requirements.
- o Would shift emphasis of public and private financial investment from outlying areas to urban areas for renovation and replacement.
- o Would stimulate housing rehabilitation and maintenance industries.
- o Would stimulate higher density residential production.
- o May affect housing industry profit/cost structure.
- o Residential land prices would increase in the urban centers and close-in areas (e.g., increased site preparation costs for bypassed land) and decline in outlying areas beyond urban services.
- o Industrial land prices not significantly impacted due to large industrial land supply within urban areas.

(continued, next page)

Housing Supply

- o Would increase conversions of older urban area single-family structures.
- o Would lower proportion of substandard units regionwide due to rehabilitation and redevelopment efforts.
- o May cause temporary lag in new residential construction in urban areas as builders adjust to zoning and subdivision regulation changes.

- o Would reduce new residential construction in outlying areas within the region.

- o Would increase new construction and rehabilitation activity throughout urban areas, particularly older development areas.

Physical Mobility

- o Could increase transit availability for all trip purposes (e.g., work, school, recreation, shopping, etc.) and for transit-dependent residents.
- o Would increase pedestrian activity as urban services are brought within closer proximity.
- o Would reduce regionwide total vehicle miles traveled.
- o Would mean shorter trips by automobile resulting in increased travel time savings.
- o Local traffic congestion may increase as local streets are used more.
- o Would mean greater inconvenience for private automobile uses (e.g., parking might be more difficult to find).

(continued, next page)

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
e. Improve highway, street, road and transit systems consistent with local actions to stage land development. f. Increase housing and job opportunities in existing urbanized areas by encouraging public and private rebuilding into compatibly mixed commercial, industrial and residential land uses. g. Encourage "infill" development of bypassed vacant land within urban service areas. h. Develop at higher densities within service areas where existing or committed urban service capacities, including transit, can support the higher densities. i. Limit development of land within urban service areas where soil, slope or other conditions can support only low-density development. j. Improve the balance of jobs and housing in jurisdictions throughout the region to reduce the necessity for long distance home-to-job travel. k. Mix residential/commercial and industrial development in communities throughout the Bay Region. l. Discourage new large-scale land development projects that are exclusively commercial, industrial or residential, unless such projects clearly demonstrate that they improve the overall balance of jobs and housing in that city, county or subregion. m. Fund new wastewater and transportation facilities only after areas served have taken actions to carry out actions of this plan.	Unknown	Cities, counties, Local Agency Formation Commissions, special districts, ABAG, MTC, BAAQMD, State Water Resources Control Board, California Department of Transportation, U.S. Department of Transportation, Environmental Protection Agency	A, I-variable	Direct administrative and regulatory costs to be estimated when agencies specify actions they will take to carry out recommendation for compact development.	Depends on specific actions.	Existing authority contained in California Government Code, Health and Safety Code, State Constitution and relevant Federal legislation.

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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Energy

- o Would reduce gasoline consumption due to less automobile travel.
- o Would increase consumption of transit-related fuel.
- o Would provide overall reduction in transportation fuel consumption.
- o Would lower per unit household energy consumption.

Amenities

- o Would preserve scenic areas.
- o Would improve visibility regionwide.
- o Would increase numbers of people exposed to noise levels of urban areas.

Consumer Expenditures

- o Could increase housing prices and rents for a short time due to any production lags as builders adjust to zoning and subdivision regulation changes.
- o Would reduce increases in residential waste collection charges.
- o May cause increases in urban area property taxes to support services to new development and because of increased land values.
- o Would reduce increases in residential and commercial energy charges.
- o Could mean more disposable income due to lower transportation costs.
- o May shift housing demand outside Bay Area
- o May affect consumer housing preference.

Health and Safety

- o Would significantly improve public health due to reduced oxidant concentrations regionwide.
- o May cause greater exposure to localized CO pollutant concentrations, depending on the success of technological controls and the amount of increase in use of transit.
- o Could increase pedestrian safety problems on local streets.

Sense of Community

- o Would enhance neighborhood identities due to diversity and density of activity.
- o Adverse social effects may result from higher density development.
- o Would increase time for non-work activity due to shorter commutes.

Equity

- o Could expand transit availability for transit-dependent residents.
- o Would broaden housing opportunities if lower per dwelling unit costs are passed on to residents.
- o Rehabilitation and redevelopment would probably displace poor, aged, minority and handicapped residents.
- o Budgets of those on low- and fixed incomes may be adversely affected due to possible cost of living increases in renewed areas.

RECOMMENDATIONS	DIRECT BENEFITS (EMISSION REDUCTIONS, TONS/DAY) 1987	IMPLEMENTING AGENCY(S)	SCHEDULE FOR ACTION A-ADOPTION I-FULLY IMPL- MENTED	TOTAL COST/YEAR OF RECOMMENDED ACTION	FINANCING MECHANISM	LEGAL AUTHORITY
a. Review development proposals for air quality effects and consistency with compact development recommendations in the plan. (Indirect Source Review) d. Adopt financial programs to support local and regional agency actions and private sector development actions consistent with policies in this chapter to reduce home-to-work distance and auto dependency. p. Adopt a coordinated regionwide program for carrying out actions for attainment and maintenance of air quality standards through development and land use management actions by cities, counties, special districts, ABAG, BAAQMD, MTC, LAFCOs, and other appropriate local and regional agencies.	Unknown	Cities, counties, Local Agency Formation Commissions, special districts, ABAG, MTC, BAAQMD, State Water Resources Control Board, California Department of Transportation, U.S. Department of Transportation, Environmental Protection Agency	A, I-variable	Direct administrative and regulatory costs to be estimated when agencies specify actions they will take to carry out recommendation for compact development.	Depends on specific actions.	Existing authority contained in California Government Code, Health and Safety Code, State Constitution and relevant Federal legislation.
3. Public Support for Transit:	See Transportation Control Measures.					
4. Additional Transportation Measures to be Identified by the California Air Resources Board: Consideration of future transportation measures identified by the CARB should be given in local planning efforts.						

ENVIRONMENTAL IMPACTS	INSTITUTIONAL/FINANCIAL IMPACTS	ECONOMIC IMPACTS	SOCIAL IMPACTS
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See preceding page.

APPENDIX G

DIRECT AND INDIRECT EMISSIONS ASSOCIATED WITH
MAJOR FEDERAL ACTIONS, 1982-1987

DIRECT AND INDIRECT EMISSIONS ASSOCIATED WITH MAJOR FEDERAL ACTIONS, 1982-1987

Introduction

This section is prepared in accordance with EPA's requirement that "in preparing the 1982 SIP revision, states and local governments should identify, to the extent possible, the direct and indirect emissions associated with major federal actions, including wastewater treatment facility grants, that will take place during the period covered by the SIP. Explicit identification of emissions will enable state and local governments to more quickly and easily evaluate subsequent federal conformity determinations." (Federal Register, Vol. 46, No. 14, pp. 7182-7194.)

Methodology

Compliance with the aforementioned requirement was complicated by the lack of criteria for identifying what is meant by both the terms "major" and "federal action." This necessitated the use of subjective judgment; OCS lease sale activity appears to be the only obvious major federal action identifiable at this time. Beyond that, the following is a list of activities which could merit consideration, should future clarification of "major federal actions" be found to encompass them.

Direct

1. Federal Buildings
 - a. post office
 - b. military hospitals
 - c. military airport creation/expansion
 - d. military base expansions, closures, realignments, etc.

Indirect

1. Permit Issuance
 - a. coal handling facility
2. Grants
 - a. synfuels
 - b. wastewater treatment/disposal
 - c. water supply facilities
 - d. coastal planning
3. Other
 - a. oil/gas lease sales
 - b. surplus land disposition

While it is presently not possible to identify in advance all relevant federal actions which will occur between now and 1987, reliance will be placed on the continuing implementation of the "Conformity Assessment of Federally-Supported Activities" process, which is presented as a recommended air quality maintenance strategy in this report, to develop a set of working criteria for determining what constitutes a "major federal action". The relevant conformity issues will be addressed within that framework.

OCS Lease Sale

The following summarizes the major findings on air quality impacts of a Five-Year Oil and Gas Leasing Schedule as presented in Volume 1 of the Final Supplement to the Final Environmental Statement prepared by the U.S. Department of the Interior, Bureau of Land Management. These impacts apply to the San Francisco Bay and North Central Coast Air Basins; it is not possible at this time to report impacts for the San Francisco Bay Air Basin alone.

- o Nineteen platforms are expected to be installed over the 38 million acres of the planning area. Cumulative onshore impacts due to the aggregate emissions from all these platforms are possible, but are unlikely to be serious if they occur at all. Each of the 19 platforms likely will affect the onshore coastal area for 5-10 years during exploration, platform installation, and development drilling and for about 30 years during the production phase. The installation of the 19 platforms will occur over a 10-year period.
- o Of the 19 proposed platforms associated with the development of the resources, approximately 15 are expected to be located in this near-shore offshore area, and will require emission controls. No new onshore refineries or gas processing plants are required under this alternative.
- o Any emission sources which would adversely affect the onshore air quality would be subject to mitigation required by EPA and the State, if located onshore, or by DOI, if located on the OCS. Required controls would conform with Best Available Control Technology (BACT), and emission offsets, if needed.
- o If a blowout, oil spill, or fire were to occur at a platform near shore, short-term violations of several NAAQS could occur onshore, depending on the type and duration of the accident.
- o A possible significant cumulative air quality impact may result from the increased level of transporting the produced products from the platforms to shore by barge. This impact could be minimized by the use of pipelines as the transport method. Another possible significant cumulative impact may result from the clustering of many platforms. This situation along with the barging of produced products to shore may result in very high localized cumulative impacts. This impact could be minimized by the piping of oil from the production platforms to shore, the application of the DOI air quality rules which have a provision to address the cumulative impact of many OCS facilities and the fact that clustering will probably not occur.
- o Conclusions. The level of expected impacts to air quality in the region is low. No new major onshore sources associated with the proposal are forecast.

Estimated representative emissions per platform for development/production operations are provided in Table 1.* It is estimated that 90 exploratory wells will be drilled to identify the resources and 465 development/production wells and 19 platforms to develop the resources under this alternative. It was assumed, for the purposes of analysis, that production from an average platform would be 0.9 million barrels of oil and 1.2 billion cubic feet of gas per year. Three-quarters of the oil produced in the region is assumed to be transported by tanker or barge, while 1/4 will be transported through subsea pipelines.

TABLE 1. ESTIMATED REPRESENTATIVE EMISSIONS (PER PLATFORM)

Activity	Pollutant Emissions (tons per year)					Notes/Source
	VOC	NO _x	TSP	SO ₂	CO	
Platform installation	16	465	22	31	75	ERG (1981) - assumes platform installation occurs over 9 months, includes all support activities
Development drilling	9	240	11	21	71	ERG (1981) - assumes 2 wells drilled at a time and 12 wells drilled per year, includes all support activities
Oil/gas production	3.8	100	3	5	26	ERG (1981) - assumes average production of .9 million barrels of oil and 1.2 billion cubic feet of gas per year - all activities including on platform operations and all support activities
Barging	29	5.8	0.2	0.4	0.8	ERG (1981) - all phases of barging including loading and unloading and transit to and from platform (platform is assumed to be 20 miles from shore and half of the oil produced is barged to shore)

* Total aggregate emissions loading appears high (if one multiplies the figures in Table 1 by 19 for each phase of operation). This total from the planning area can be calculated but is not a useful measure of the onshore air quality impacts. These impacts at a particular location are the critical factors and are dependent on the location of platforms, the phase of operation and its level of activity and the number of platforms that can potentially affect the onshore air quality at that location. In reality, onshore impacts will be spread along the entire coastline in relationship to the location and distance from shore of the platforms.

APPENDIX H

TRANSPORTATION CONFORMITY ASSESSMENT PROCEDURES AND CONTINGENCY PLAN

Conformity Assessment

Section 176(c) of the Clean Air Act includes a provision that:

No metropolitan planning organization designated under section 134 of title 23, United States Code, shall give its approval to any project, program, or plan which does not conform to a plan approved or promulgated under Section 110

MTC is the MPO for the Bay Area. The above requirement will be satisfied in the following manner.

- o The Regional Transportation Plan will be assessed yearly at the time it is being amended (September) to determine if it complies with the Air Quality Plan
- o The Transportation Improvement Program (TIP) will be reviewed each year to determine its compliance with the Air Quality Plan. All transportation projects with Federal funding must be in the TIP.
- o Individual project applications currently undergo an environmental assessment by MTC. This will also serve to ensure conformity.

Contingency Plan

EPA guidelines require a contingency plan for transportation measures which will be implemented if reasonable further progress is not achieved. This contingency plan contains two elements:

- a) List of transportation projects with potentially adverse air quality impacts which will be delayed while the air quality plan is being revised.

MTC believes that providing a list of specific projects in this plan is impractical for two reasons:

- o the project list would change depending on the year that the RFP target is not met
- o the environmental documentation on projects in the later years of the Transportation Improvement Program (TIP) is not yet available in most cases.

Accordingly, if the RFP target is not met, MTC may delay certain categories of projects in the TIP if they are shown to have significant adverse impact on air quality. The criteria for delaying projects and specific projects to be delayed will be determined following the initial public hearing under section b. The categories which may be delayed include:

- o Freeway Congestion Relief Projects (HB 42)*
- o Freeway Traffic Service Projects (HB 43)
- o Conventional Highway and Expressway Operational Improvement Projects (HB 44)
- o New Connections and Cross-Traffic Improvements (HE 11)
- o Upgraded Facilities (HE 12)
- o Lane Additions (HE 13)
- o New Highways (HE 14)
- o Projects funded by the Federal Aid Urban Program which increase roadway capacity.

b) Process for determining/implementing additional TCM's

If a determination is made that the RFP target is not being met, within 6 months MTC will:

- o hold an initial public hearing to solicit comments on highway projects to be delayed and suggestions on additional controls
- o review progress made in implementing controls adopted in the Air Quality Plan
- o Analyze additional controls.
- o Hold a final public hearing prior to adoption of additional measures.

*Designation refers to CalTrans category.

APPENDIX K

CALIFORNIA AIR RESOURCES BOARD

NEW VEHICLE STANDARDS SUMMARY

CALIFORNIA AIR RESOURCES BOARD
NEW VEHICLE STANDARDS SUMMARY

PASSENGER CARS - EXHAUST EMISSIONS STANDARDS

The following California standards, up through 1979, and federal standards, up through 1974, apply only to gasoline-powered passenger cars(1). Federal standards for 1975 and later and California standards for 1980 and later, apply to both gasoline and diesel-powered passenger cars.

<u>YEAR</u>	<u>STANDARD</u>	<u>TEST PROCEDURE</u>	<u>HYDRO-CARBONS(HC)</u>	<u>CARBON MONOXIDE(CO)</u>	<u>OXIDES OF NITROGEN(NOx)</u>
Prior to controls	none	7-mode	850 ppm	3.4%	1000 ppm
		7-mode	11 g/mi	80 g/mi	4 g/mi
		CVS-75	8.8 g/mi	87.0 g/mi	3.6 g/mi

50,000 MILE EXHAUST EMISSIONS STANDARDS

1966-67	Calif.	7-mode	275 ppm	1.5%	no std.
1968-69	Calif.	7-mode			no std.
	federal	50-100 CID	410 ppm	2.3%	no std.
		101-140 CID	350 ppm	2.0%	no std.
		over-140 CID	275 ppm	1.5%	no std.

(GRAMS PER MILE)

1970	Calif. federal	7-mode	2.2	23	no std.
1971	Calif. federal	7-mode	2.2	23	4.0
		7-mode	2.2	23	no std.
1972	Calif.	7 mode or	1.5	23	3.0
	Calif.	CVS-72	3.2	39	3.2 (2)
	federal	"	3.4	39	no std.
1973	Calif.	CVS-72	3.2	39	3.0
	federal	"	3.4	39	3.0
1974	Calif.	"	3.2	39	2.0
	federal	"	3.4	39	3.0
1975-76	Calif.	CVS-75	0.9 (3)	9.0	2.0
	federal	"	1.5	15	3.1
1977-79	Calif.	"	0.41	9.0	1.5
	federal	"	1.5	15	2.0

(Revised 1/12/82)

PASSENGER CARS

50,000 MILE EXHAUST EMISSIONS STANDARDS
CVS-75 Test Procedure

(GRAMS PER MILE)

YEAR	STANDARD	HYDROCARBONS (4)		CARBON MONOXIDE CO	OXIDES OF NITROGEN NOx
		Non- Methane	Total HC		
1980	Calif. federal	0.39 no std.	(0.41) (0.41)	9.0 7.0	1.0(8) 2.0
1981	Calif. (b) Option A " (b) Option B federal	no std. 0.39 no std.	(0.41) (0.41) (0.41)	3.4 7.0 3.4	1.0(8) 0.7(8) 1.0
1982	Calif. (b) Option A " (b) Option B federal	0.39 0.39 no std.	(0.41) (0.41) (0.41)	7.0 7.0 3.4	0.4(9) 0.7(9) 1.0
1983 & Subse- quent	Calif. " federal	0.39 0.39 no std.	(0.41) (0.41) (0.41)	7.0 7.0 3.4	0.4(10) 0.7(11) 1.0

CALIFORNIA 100,000 MILE EXHAUST EMISSIONS STANDARDS
CVS-75 Test Procedure
(GRAMS PER MILE)

1980	(6)(7) Option 1 (6)(7) Option 2	0.39 0.46	(0.41) no std.	9.0 10.6	1.5 1.5
1981	(6)(7) Option 1 (6)(7) Option 2	0.39 0.46	no std. no std.	3.4 4.0	1.5 1.5
1982-83	(6) Option 1 (6) Option 2	0.39 0.46	(0.41) no std.	7.0 8.3	1.5 1.5
1984 & Subse- quent	(6) Option 1 (b) Option 2	0.39 0.46	(0.41) no std.	7.0 8.3	1.0 1.0

- (1) Passenger car as defined in Title 13 of the California Administrative Code means any motor vehicle designed primarily for transportation of persons having a capacity of twelve persons or less.
- (2) Hot 7-mode test.
- (3) Hydrocarbon emissions from 1975-76 limited production vehicles may not exceed 1.5 gm/mi.
- (4) Hydrocarbon standards in parentheses indicate total hydrocarbons. When applicable, manufacturers may elect to certify vehicle to either the nonmethane or total hydrocarbon standards.

PASSENGER CARS

- (5) For the 1981 model year, manufacturers may choose either options A or B for their entire 50,000 mile certified product line. The option chosen in 1981 must be retained for the 1982 model year.
- (6) 100,000 mile options: Option 1 standards refer to the projected 50,000 mile emissions for hydrocarbons and carbon monoxide while Option 2 standards refer to the projected 100,000 mile emissions for these pollutants. NOx emission standards for both options refer to the 100,000 mile projected emissions.
- (7) For vehicles with evaporative emissions values below 1.0 g/test, an adjustment to the exhaust hydrocarbon emissions standard may be granted by the Executive Officer (100,000 mile option only).
- (8) 1.5 g/mi NOx standard for small manufacturers subject to "in lieu" standards pursuant to Section 1960.2 of Title 13, California Administrative Code. Production passenger cars must meet a 1.0 g/mi cumulative corporate average NOx standard based upon a full year's production.
- (9) 1.0 g/mi NOx standard for small manufacturers subject to "in lieu" standards pursuant to Section 1960.4 of Title 13, California Administrative Code. Production passenger cars must meet a 0.7 g/mi cumulative corporate average NOx standard for the full 1982 model year production.
- (10) 0.7 g/mi NOx standard for the 1983 and 1984 model years for small manufacturers subject to "in lieu" standards pursuant to Section 1960.4 of Title 13, California Administrative Code. Production passenger cars must meet a 0.7 g/mi cumulative corporate average NOx standard for each production quarter. For 1985 and subsequent model years a small manufacturer must meet a 0.4 g/mi NOx standard for the prototype vehicle certification and for production vehicles per engine family on a quarterly basis.
- (11) A manufacturer may choose to certify to this optional set of standards provided that the conditions set forth in Section 1960.15, Title 13, California Administrative Code are met. These conditions include a 7 year/75,000 mile recall provision for selected emission control parts.

Additional Requirements

Beginning with the 1980 model-year, the maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test shall be no greater than 1.33 times the applicable passenger car oxides of nitrogen standards shown above.

Effective 1978, evaporative emission standards are 6.0 grams per SHED test for the 1978-79 model years and 2.0 grams per SHED test for 1980 and later model years.

SHED Test (Sealed Housing Evaporative Determination) - A method for measuring evaporative emissions from motor vehicles.

Previous evaporative emission standards of 6.0 grams per test for 1970-71 and 2.0 grams per test for 1972 and later were based on the "carbon trap procedure" which became obsolete when the SHED test procedure was adopted for 1978 and subsequent model years.

Beginning with the 1982 model year diesel-powered passenger cars must meet a 0.6 g/mi particulate standard. Commencing with the 1985 and subsequent model years the particulate standard is 0.2 g/mi.

g/mi	-	grams per mile.
CVS-72	-	constant volume sample cold start test.
CVS-75	-	constant volume sample test which includes cold and hot starts.
7-mode	-	137 second driving cycle test.
ppm	-	parts per million.

NEW VEHICLE STANDARDS SUMMARY

LIGHT-DUTY TRUCKS - EXHAUST EMISSION STANDARDS

The following California standards, up through 1977, and federal standards, up through 1975, apply only to gasoline-powered light-duty trucks(1). Federal standards for 1975 and later and California standards for 1978 and later apply to both gasoline and diesel-powered light-duty trucks.

50,000 MILE EXHAUST EMISSIONS STANDARDS

<u>YEAR</u>	<u>STANDARD</u>	<u>TEST PROCEDURE</u>	<u>HYDRO- CARBONS(HC)</u>	<u>CARBON MONOXIDE(CO)</u>	<u>OXIDES OF NITROGEN(NOx)</u>
1966-67	Calif.	7-mode	275 ppm	1.5%	no std.
1968-69	Calif.	7-mode			
	federal	50-100 CID	410 ppm	2.3%	no std.
		101-140 CID	350 ppm	2.0%	no std.
		over-140 CID	275 ppm	1.5%	no std.
(GRAMS PER MILE)					
1970	Calif.	7-mode	2.2	23	no std.
	federal				
1971	Calif.	7-mode	2.2	23	4.0
	federal	7-mode	2.2	23	no std.
1972	Calif.	7 mode or	1.5	23	3.0
	Calif.	CVS-72	3.2	39	3.2 (2)
	federal	"	3.4	39	no std.
1973	Calif.	CVS-72	3.2	39	3.0
	federal	"	3.4	39	3.0
1974	Calif.	"	3.2	39	2.0
	federal	"	3.4	39	3.0
1975	Calif.	CVS-75	2.0	20	2.0
	federal	"	2.0	20	3.1
1976-78	Calif.	"	0.9	17	2.0
	federal	"	2.0	20	3.1
1979	Calif.(3)	"	0.41	9.0	1.5(6)
	"(4)	"	0.50	9.0	2.0
	federal(5)	"	1.7	18	2.3

LIGHT-DUTY TRUCKS

50,000 MILE EXHAUST EMISSIONS STANDARDS
CVS-75 Test Procedure

(GRAMS PER MILE)

<u>YEAR</u>	<u>STANDARD</u>	<u>HYDROCARBONS(8)</u>		<u>CARBON</u> <u>MONOXIDE</u>	<u>OXIDES OF</u> <u>NITROGEN</u>
		<u>Non-</u> <u>Methane</u>	<u>Total</u> <u>HC</u>	<u>CO</u>	<u>NOx</u>
1980	Calif.(3)	0.39	(0.41)	9.0	1.5(6)
	" (4)	0.50	(0.50)	9.0	2.0
	federal	no std.	(1.7)	18.0	2.3
1981-82	Calif.(3)	0.39	(0.41)	9.0	1.0(7)
	" (4)	0.50	(0.50)	9.0	1.5
	federal	no std.	(1.7)	18.0	2.3
1983 & Subse- quent	Calif.(3)	0.39	(0.41)	9.0	0.4(11)
	" (3)	0.39	(0.41)	9.0	1.0(12)
	" (4)	0.50	(0.50)	9.0	1.0
	federal	no std.	(1.7)	18.0	2.3

CALIFORNIA 100,000 MILE EXHAUST EMISSIONS STANDARDS
CVS-75 Test Procedure
(GRAMS PER MILE)

1981-83	(3) Option 1(9)(10)	0.39	(0.41)	9.0	1.5
	(3) Option 2(9)(10)	0.46	no std.	10.6	1.5
	(4) (10)	0.50	(0.50)	9.0	2.0
1984 & Subse- quent	(3) Option 1(9)	0.39	(0.41)	9.0	1.0
	(3) Option 2(9)	0.46	no std.	10.6	1.0
	(4)	0.50	(0.50)	9.0	1.5

(1) Light-duty trucks as defined by Title 13 of the California Administrative Code means any motor vehicle rated at 6,000 lbs. GVW or less which is designed primarily for purposes of transportation of property or is a derivative of such vehicle, or is available with special feature enabling off-street or off-highway operation and use.

(2) Hot 7-mode test.

(3) 0-3999 pounds equivalent inertia weight (curb weight plus 300 pounds).

(4) 4000-5999 pounds equivalent inertia weight.

LIGHT-DUTY TRUCKS

- (5) Effective 1979, federal LDT classification will be extended to 8500 pounds GVW.
- (6) 2.0 g/mi NOx for four-wheel drive vehicles in this category.
- (7) 1.5 g/mi NOx for small manufacturers subject to "in lieu" standards pursuant to Section 1960.3 of Title 13, California Administrative Code. Production light-duty trucks must meet a 1.0 g/mi cumulative corporate average NOx standard based upon a full year's production.
- (8) Hydrocarbon standards in parentheses indicate total hydrocarbon. When applicable, manufacturers may elect to certify vehicles to either the non-methane or total hydrocarbon standards.
- (9) 100,000 mile options: Option 1 standards refer to the projected 50,000 mile emissions for hydrocarbons and carbon monoxide while Option 2 standards refer to the projected 100,000 mile emissions for these pollutants. NOx emission standards for both options refer to the 100,000 mile projected emissions.
- (10) For 1981 model year vehicles with evaporative emissions values below 1.0 g/test, an adjustment to the exhaust hydrocarbon emissions standard may be granted by the Executive Officer (100,000 mile option only).
- (11) 1.0 g/mi NOx standard for small manufacturers subject to "in lieu" standards pursuant to Section 1960.4 of Title 13, California Administrative Code. Production light-duty trucks must meet a 0.7 g/mi cumulative corporate average NOx standard for the full model year's production.

0.7 g/mi NOx standard for small manufacturers for the 1984 and 1985 model years. Production light-duty trucks must meet a 0.7 g/mi cumulative corporate average NOx standard for each production quarter.

For the 1986 and subsequent model years a small manufacturer must meet a 0.4 g/mi NOx standard for the prototype vehicle certification and for production vehicles per engine family on a quarterly basis.
- (12) A manufacturer may choose to certify to this optional set of standards provided that the conditions set forth in Section 1960.15, Title 13, California Administrative Code are met. These conditions include a 7 year/75,000 mile recall provision for selected emission control parts.

g/mi	-	grams per mile.
CVS-72	-	constant volume sample cold start test.
CVS-75	-	constant volume sample which includes cold and hot starts.
7-mode	-	137 second driving cycle test.
ppm	-	parts per million

LIGHT-DUTY TRUCKS

Additional Requirements

Beginning with the 1981 model year, the maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test shall be no greater than 2.0 times the applicable light-duty truck oxides of nitrogen standards shown above.

Effective 1978, evaporative emission standards are 6.0 grams per SHED test for 1978-79 model year and 2.0 grams per SHED test for 1980 and later model year.

SHED Test (Sealed Housing Evaporative Determination) - A method for measuring evaporative emissions from motor vehicles.

Previous evaporative emission standards of 6.0 grams per test for 1970-71 and 2.0 grams per test for 1972 and later were based on the "carbon trap procedure" which became obsolete when the SHED test procedure was adopted for 1978 and subsequent model years.

Beginning with the 1982 model year diesel-powered light-duty trucks must meet a 0.6 g/mi particulate standard. Commencing with the 1985 and subsequent model years the particulate standard is 0.26 g/mi.

NEW VEHICLE STANDARDS SUMMARY

MEDIUM-DUTY VEHICLES - EXHAUST EMISSIONS STANDARDS

The following California standards, up through 1972, and federal standards, up through 1973, apply only to gasoline-powered medium-duty vehicles(1). California standards for 1973 and later year and federal standards for 1974 and later apply to both gasoline and diesel-powered medium-duty vehicles.

YEAR	STANDARD	HYDROCARBONS(5)		CARBON MONOXIDE	OXIDES OF NITROGEN
		Non- Methane	Total HC	CO	NOx
1969-77	Calif.	SEE HEAVY-DUTY STANDARDS			
1970-78	federal	SEE HEAVY-DUTY STANDARDS			

50,000 MILE EXHAUST EMISSIONS STANDARDS CVS-75 Test Procedure (GRAMS PER MILE)

1978-79	Calif.	no std.	(0.9)	17	2.3
1979	federal	see light-duty truck standards			
1980	Calif.	0.9	(0.9)	17	2.3
	federal	no std.	(1.7)	18	2.3
1981-82	Calif. (2)	0.39	(0.41)	9.0	1.0(8)
	" (3)	0.50	(0.50)	9.0	1.5
	" (4)	0.60	(0.60)	9.0	2.0
	federal	no std.	(1.7)	18.0	2.3
1983 & Subse- quent	Calif. (2)	0.39	(0.41)	9.0	0.4(9)
	" (2)	0.39	(0.41)	9.0	1.0(10)
	" (3)	0.50	(0.50)	9.0	1.0
	" (4)	0.60	(0.60)	9.0	1.5
	federal	no std.	(1.7)	18.0	2.3

MEDIUM-DUTY VEHICLES

CALIFORNIA 100,000 MILE EXHAUST EMISSIONS STANDARDS CVS-75 Test Procedure

YEAR	STANDARD	HYDROCARBONS (5)		CARBON MONOXIDE CO	OXIDES OF NITROGEN NOx
		Non- Methane	Total HC		
1981	(2)Option 1(6)(7)	0.39	(0.41)	9.0	1.5
	(2)Option 2(6)(7)	0.46	no std.	10.6	1.5
	(3)	0.50	(0.50)	9.0	2.0
	(4)	0.60	(0.60)	9.0	2.3
1983	(2)Option 1(6)	0.39	(0.41)	9.0	1.5
	(2)Option 2(6)	0.46	no std.	10.6	1.5
	(3)	0.50	(0.50)	9.0	2.0
	(4)	0.60	(0.60)	9.0	2.0
1984 & Subse- quent	(2)Option 1(6)	0.39	(0.41)	9.0	1.0
	(2)Option 2(6)	0.46	no std.	10.6	1.0
	(3)	0.50	(0.50)	9.0	1.5
	(4)	0.60	(0.60)	9.0	2.0

- (1) Medium-duty vehicles as defined in Title 13 of the California Administrative Code means any heavy-duty vehicles having a manufacturer's gross vehicle weight rating of 8,500 pounds or less (Manufacturers may elect to certify medium-duty vehicles up to 10,000 pounds (GVW)).
- (2) 0-3999 pounds equivalent inertia weight (curb weight plus 300 pounds).
- (3) 4000-5999 pounds equivalent inertia weight.
- (4) 6000-8500 (or 10,000) pounds equivalent inertia weight.
- (5) Hydrocarbon standards in parentheses indicate total hydrocarbon. When applicable, manufacturers may elect to certify vehicles to either the non-methane or total hydrocarbon standards.
- (6) 100,000 mile options: Option 1 standards refer to the projected 50,000 mile emissions for hydrocarbons and carbon monoxide while Option 2 standards refer to the projected 100,000 mile emissions for these pollutants. NOx emission standards for both options refer to the 100,000 mile projected emissions.
- (7) For 1981 model year vehicles with evaporative emissions values below 1.0 g/test, an adjustment to the exhaust hydrocarbon emissions standard may be granted by the Executive Officer (100,000 mile option only).

MEDIUM-DUTY VEHICLES

- (8) 1.5 g/mi NOx for small manufacturers subject to "in lieu" standards pursuant to Section 1960.3 of Title 13, California Administrative Code. Production medium-duty vehicles must meet a 1.0 g/mi cumulative corporate average NOx standard based upon a full year's production.
- (9) 1.0 g/mi NOx standard for small manufacturers subject to "in lieu" standards pursuant to Section 1960.4 of Title 13, California Administrative Code. Production medium-duty vehicles must meet a 0.7 g/mi cumulative corporate average NOx standard for the full model year's production.

0.7 g/mi NOx standard for small manufacturers for the 1984 and 1985 model years. Production medium-duty vehicles must meet a 0.7 g/mi cumulative corporate average NOx standard for each production quarter.

For the 1986 and subsequent model years a small manufacturer must meet a 0.4 g/mi NOx standard for the prototype vehicle certification and for production vehicles per engine family on a quarterly basis.

- (10) A manufacturer may choose to certify to this optional set of standards provided that the conditions set forth in Section 1960.15, Title 13, California Administrative Code are met. These conditions include a 7 year/75,000 mile recall provision for selected emission control parts.

g/mi - grams per mile
CVS-75 - constant volume sample test which includes cold and hot starts.

Additional Requirements

Beginning with the 1981 model year, the maximum projected emissions of oxides of nitrogen measured on the federal Highway Fuel Economy Test shall be no greater than 2.0 times the applicable medium-duty vehicle oxides of nitrogen standards shown above.

Effective 1978, evaporative emission standards are 6.0 grams per SHED test for the 1978-79 model years and 2.0 grams per SHED for 1980 and later model years.

SHED Test (Sealed Housing Evaporative Determination) - A method for measuring evaporative emissions from motor vehicles.

Previous evaporative emission standards of 6.0 grams per test for 1970-71 and 2.0 grams per test for 1972 and later were based on the "carbon trap procedure" which became obsolete when the SHED test procedure was adopted for 1978 and subsequent model years.

Beginning with the 1982 model year, diesel-powered medium-duty vehicles must meet a 0.6 g/mi particulate standard. Commencing with the 1985 and subsequent model years, the particulate standard is 0.26 g/mi.

NEW VEHICLE STANDARDS SUMMARY

HEAVY-DUTY ENGINES AND VEHICLES - EXHAUST EMISSION STANDARDS (DIESEL (1) AND GASOLINE)

The following is a summary of heavy-duty engine and vehicle (2) standards adopted by both the California Air Resources Board and federal Environmental Protection Agency, based on the 9-mode test procedures for gasoline engines and 13-mode test procedures for diesel engines. Also see footnote (5).

<u>YEAR</u>	<u>STANDARD</u>	<u>HYDRO-CARBONS</u>	<u>CARBON MONOXIDE</u>	<u>OXIDES OF NITROGEN</u>	<u>HYDROCARBONS & OXIDES OF NITROGEN</u>
1969-71 (3)	Calif.	275 ppm	1.5%	no std.	no std.
1970-73 (4)	federal	275 ppm	1.5%	no std.	no std.
1972	Calif.	180 ppm	1.0%	no std.	no std.
(GRAMS PER BRAKE-HORSEPOWER-HOUR)					
1973-74	Calif.	no std.	40	no std.	16
1973-78	federal	no std.	40	no std.	16
1975-76	Calif.	no std.	30	no std.	10
1977-78	Calif. or	no std.	25	no std.	5
	Calif.	1.0	25	7.5	no std.
1979 (6)	Calif. or	1.5	25	7.5	no std.
	Calif. or	no std.	25	no std.	5
	Calif.	1.0	25	7.5	no std.
1979-1983	federal or	1.5	25	no std.	10
	federal	no std.	25	no std.	5
1980-83	Calif. or	1.0	25	no std.	6.0
	Calif.	no std.	25	no std.	5
1984 & later	Calif. or	0.5	25	no std.	4.5
	Calif. (5)	1.3	15.5	5.1	no std.
	federal (5)	1.3	15.5	10.7	no std.

- (1) The above standards apply to diesel engines and vehicles sold in California on or after January 1, 1973 and nationwide on or after January 1, 1974.
- (2) These standards apply to motor vehicles having a manufacturer's GVW rating of over 6000 pounds, excluding passenger cars and 1978 and later medium-duty vehicles.
- (3) Applies to vehicles manufactured on or after January 1, 1969.
- (4) Applies to vehicles manufactured on or after January 1, 1970.
- (5) These standards are based upon the new transient cycle test procedures.

HEAVY-DUTY ENGINES AND VEHICLES

- (6) For 1979 only, manufacturer using heated flame ionization detection (HFID) method of measuring hydrocarbons must meet the 1.5 g/bhp-hr standard; whereas manufacturers using non-dispersive infrared (NDIR) method of measuring hydrocarbons must meet the 1.0 g/bhp-hr standard. Both standards are equivalent in stringency. Manufacturers may use either HFID or NDIR in meeting the combined hydrocarbon and oxides of nitrogen standard of 5 g/bhp-hr. After 1979, manufacturers are required to use HFID.

g/bhp-hr - grams per brake-horsepower-hour

ppm - parts per million.

Additional Requirements

Effective 1978, evaporative emission standards are 6.0 grams per SHED test for the 1978-79 model years and 2.0 grams per SHED test for 1980 and later model years.

SHED Test (Sealed Housing Evaporative Determination) A method for measuring evaporative emissions from motor vehicles.

Previous evaporative emission standards of 6.0 grams per test for 1970-1971 and 2.0 grams per test for 1972 and later were based on the "carbon trap procedure" which became obsolete when the SHED test procedure was adopted for 1978 and subsequent model years.

NEW VEHICLE STANDARDS SUMMARY

MOTORCYCLES

The following is a summary of motorcycle (1) standards adopted by both the California Air Resources Board and the federal Environmental Protection Agency.

<u>YEAR</u>	<u>STANDARD</u>	<u>DISPLACEMENT(2)(4)</u>	<u>HYDROCARBONS</u>	<u>CARBON MONOXIDE</u>
1978-79	Calif. & federal	50-169	5.0 g/km	17 g/km
		170-749	$5.0 + 0.0155$ (D-170) g/km (3)	17 g/km
		750 or greater	14 g/km	17 g/km
1980-81	Calif.	All (50 or greater)	5.0 g/km	12 g/km
1980 & later	federal	All (50 or greater)	5.0 g/km	12 g/km
1982 & later	Calif.	50-279	1.0 g/km (5)	12 g/km
1982 and 1983		280 or greater	2.5 g/km	12 g/km
1984 and later		280 or greater	1.0 g/km	12 g/km

(1) Any motor vehicle other than a tractor having a seat or saddle for the use of the rider and designed to travel on not more than three wheels in contact with the ground and weighing less than 1500 pounds, except that four wheels may be in contact with the ground when two of the wheels function as a sidecar.

(2) Displacement shown in cubic centimeters.

(3) Motorcycle Hydrocarbon Formula

D = engine displacement in cubic centimeters

e.g., 300 cc engine; standard = $(300-17) \times .0155 + 5.0 = 7.0$ g/km

(4) Federal classifications based on engine displacement are:

<u>Class</u>	<u>Displacement (cc)</u>
I	50-169
II	170-279
III	280-greater

(5) Small volume manufacturers (under 3,000 new units sold per year in California) can apply for a standard of up to 5.0 grams per kilometer hydrocarbon exhaust for 1982 model year Class I and II motorcycles only.

g/km = grams per kilometer

MOTORCYCLES

Additional Requirements

Effective 1983, evaporative emission standards for Classes I and II are 6.0 grams per SHED test for 1983-84 model years, and 2.0 grams per SHED test for 1985 and later model years.

Effective 1984, evaporative emission standards for Class III are 6.0 grams per SHED test for 1984-85 model years, and 2.0 grams per SHED test for 1986 and later model years.

SHED Test (Sealed Housing Evaporative Determination) - A method for measuring evaporative emissions from motorcycles.

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